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ABSTRACT

Thirty-six units of instruction are included in this core curriculum in animal science for postsecondary farm and ranch management programs. Units of instruction are divided into seven instructional areas: (1) Livestock Types, (2) Livestock Programs, (3) Nutrition, (4) Animal Health, (5) Animal Breeding, (6) Animal Improvement, and (7) Livestock Facilities. Each unit follows a typical format that includes terminal objectives, specific transparency masters, assignment sheets, and tests. (EFE)

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KANSAS POSTSECONDARY FARM AND RANCH MANAGEMENT PROJECT

The identification of tasks performed by workers in production agriculture, and the preparation of instructional materials for use by teachers of farm and ranch management programs.

ANIMAL SCIENCE
BASIC CORE CURRICULUM

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LIVESTOCK TYPES

UNIT I

TYPES OF BEEF CATTLE

TERMINAL OBJECTIVE

Upon completion of this unit, students will be able to identify breeds, characteristics, grades, and performance traits of beef cattle. This objective will be considered achieved by scoring at least eighty-five percent on the test.

SPECIFIC OBJECTIVES

After completion of this unit, students will be able to:

1. Match terms associated with beef cattle to the correct definitions.
2. Match beef breeds to their correct characteristics.
3. Identify the parts of the beef animal.
4. Name two desirable characteristics of a market steer and two of a breeding beef animal.
5. List three areas of classification of beef cattle.
6. List the two criteria on which feeder cattle grades are based.
7. Calculate the exact frame score for a 13 month old steer that is 50.5 inches tall at his hip.
8. List the slaughter quality grades for beef cattle and the factors involved in their determination.
9. Calculate the final yield grade for a given beef slaughter animal when given the fat thickness, loin eye area, and per cent internal fat.
10. Identify the wholesale cuts of beef.
11. List the nine factors affecting the quantity and quality of beef carcasses.

LIVESTOCK TYPES

UNIT I

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheet
2. Provide students with Information Sheets
3. Make Transparencies
4. Discuss Terminal and Specific Objectives
5. Discuss Information Sheets
6. Introduce unit by explaining terminology on the Information Sheet
7. Discuss and show examples of beef breeds, crossbreeding systems, and desirable traits of beef cattle with video aids
8. Summarize unit by stressing need for improvement in beef breeding through selection in breeding
9. Give Test

Students:

1. Read Objectives
2. Study Information Sheets
3. Take Test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objective Sheet
2. Information Sheets

INSTRUCTIONAL MATERIALS

3. Transparency Masters

   TM 1 - PARTS OF THE BEEF ANIMAL

   TM 2 - DESIRABLE CHARACTERISTICS OF A MARKET STEER

   TM 3 - DESIRABLE CHARACTERISTICS OF A BREEDING HEIFER

   TM 4 - DESIRABLE CHARACTERISTICS OF A BREEDING BULL

   TM 5 - FEEDER CATTLE FRAMES

   TM 6 - FEEDER CATTLE THICKNESS

   TM 7 - FRAME SCORE CHART

   TM 8 - FRAME SIZE EXAMPLES

   TM 9 - SLAUGHTER QUALITY GRADES FOR STEERS

   TM 10 - SLAUGHTER YIELD GRADES FOR STEERS

   TM 11 - WHOLESALE CUTS OF BEEF

   TM 12 - NINE DEGREES OF MARBLING IN BEEF CARCASSES

4. Test

5. Answers to Test

References:

1. Hunsley, Roger E,; Beeson, W.Malcolm; and Nordby, Julius E. Livestock Judging, Selection and Evaluation. Danville, Illinois: The Interstate Printers and Publishers, Inc. 1978.

2. Neumann, A.L., Beef Cattle. New York: John Wiley and Sons. 1977.

3. Bogart, Ralph. Scientific Farm Animal Production. Minneapolis: Burgess Publishing Co., 1977.

4. Doane's Farm Management Guide. St. Louis: Doane Agricultural Service Inc., 1980.

5. Able, Bill V; Allen, Dell M; Hines, Robert H; McKee, Miles. Animal Science and Industry Laboratory Manual. Dubuque, Iowa: Kendall Hunt Publishing Co., 1978.

6. Crossbreeding for Iowa Beef Cattle Production. Ames, Iowa: Cooperative Extension Service, Iowa State University, 1975.

INSTRUCTIONAL MATERIALS

7. Beef Cattle Breeds. Washington: U.S. Government Printing Office, USDA Farmer's Bulletin No. 2228. 1975.

8. Orwig, Tom. New Feeder Cattle Grades. Manhattan Kansas: Cooperative Extension Service, Kansas State University. 1980.

LIVESTOCK TYPES

UNIT I

INFORMATION SHEET

I. Terms and Definitions

- A. Polled - Naturally or genetically hornless
- B. Bull - Bovine male of breeding age
- C. Cow - Sexually mature bovine female
- D. Steer - Castrated bovine male castrated early in life before puberty
- E. Stag - Castrated male that reached sexual maturity prior to castration
- F. Heifer - Young female bovine cow prior to the time she has produced her first calf
- G. Stocker calf - Calf purchased to go back to a farm or ranch to grow before it goes to a feedlot or is developed as a breeding animal
- H. Feeder calf - Calf purchased to go directly into the feedlot
- I. Calf - Young male or female bovine
- J. Baby beef - Young slaughtered beef animals weighing about 1,000 lbs and are well finished at one year of age.
- K. Carcass merit - Value of a carcass for consumption
- L. Conformation - Physical form of an animal; its shape and arrangement of parts
- M. Fertility - Ability to initiate, sustain and support reproduction
- N. Hybrid - Offspring of genetically unlike parents
- O. Purebred - Animal that meets the standard of a recognized breed and whose ancestors are registered in the herd book of that breed

INFORMATION SHEET

II. Breed Characteristics

A. Angus

1. Polled and black in color
2. Stylish, alert, with excellent balance
3. Medium size bone
4. Early sexual maturity and high fertility

B. Brahman

1. Silver-grey is most preferred color
2. Deep-bodied and very muscular
3. Long head and pronounced hump
4. Trim middle and have a high dressing percentage when condition is considered
5. Are crossed with other breeds and the produce marketed

C. Chianina

1. A taller, longer, and cleaner type of cattle
2. Ectomorphic in shape (long-boned and long-muscled)
    a. Provides ease of calving
    b. Freedom from double muscling
3. Black pigmentation dominant on first cross with other breeds

D. Hereford (Whitefaces)

1. White hair on face and jaws, under the neck, on the brisket and chest floor, under the belly, on the flanks and tail, and on top of the neck
2. Distinguished for their size, uniformity in type and color, smooth shoulders, excellent heads, chest and body capacity, and vigor
3. Long bodied, well-sprung ribs, long rump, thick hindquarters, and balanced

INFORMATION SHEET

E. Charolais

  1. White or very light straw color
  2. Big, long-bodied, heavy muscled animal
  3. High feed efficiency and high weight per day of age
  4. Heavy muscling in loin and round

F. Maine-Anjou

  1. Red, red with white spots, or dark roan color
  2. Long, with long rump
  3. Moderately deep with average bone structure
  4. Growth rate and production of prime quality carcass are strong parts of the breed

G. Murray Grey

  1. Silver grey to dark grey color
  2. Polled and widely known as a docile breed
  3. Slightly bigger but similar in conformation to the Angus

H. Polled Hereford

I. Scotch Highland

  1. Small to average size breed
  2. Long, coarse outer yellow hair
  3. Very hardy and good foragers
  4. Used in northern U.S. to infuse greater winter hardiness

J. Simmental

  1. Yellow-brown to dark red color with white head and underside of brisket and belly, white legs and tail
  2. Exceptionally docile
  3. Large, well-muscled and rugged in appearance
  4. Milk production one of the most important genetic traits

INFORMATION SHEET

K. Shorthorn

  1. Red, white, roan, or red and white combined
  2. Solid red preferred color
  3. Large, rugged-framed, heavy-boned, and thick-fleshed cattle
  4. Stretchy and trim throughout with high-quality bone

L. Polled Shorthorn

M. Beef Friesian

  1. Extremely fertile, cycling early and settling quickly
  2. Females known for calving ease. Calving ease is in direct correlation to days in gestation period
  3. Transmit an exceptionally rapid growth factor

N. Devon

  1. Dark cherry red color
  2. Docile
  3. Excellent rustlers and active grazers
  4. Noted for growthiness, cutability, and producing high-quality meat

O. Beefmaster

  1. Three-way cross of 50% Brahman, 25%Hereford, and 25% Shorthorn
  2. Favored by people ranching in harsh situations
  3. Persistent rustlers and highly resistant to many diseases
  4. Have been intensively selected for milk production

P. Galloway

  1. Polled with long black hair
  2. Emphasis on hardiness, carcass quality, foraging ability, quick response to good feeding, and on good coats, wide muzzles, and good feet and legs

INFORMATION SHEET

Q. Brangus

1. Polled and black in color
2. 5/8 Angus and 3/8 Brahman - Carcass quality of Angus with size and ruggedness of Asian Brahman
3. Deep and long bodies and large frame
4. Slight hump over neck, sleek coat, and some loose neck folds
5. Brangus bulls used for maximum crossbreeding advantages

R. Limousin

1. Red-gold color over back with tan color under the belly and around the eyes and muzzle
2. Noted for ease of calving, high fertility, and carcass leanness
3. Limousin crossbreds show efficient, low-cost feedlot gain as much as 25% better than conventional feeder cattle

S. Red Angus

1. Derived from Black Angus crossed with red longhorns
2. High weaning weights
3. Early maturing calves that "grade" early
4. Excellent mothers
5. Adaptable to sub-tropical climates

T. Red Poll

1. Light red to very dark red in color
2. Dual purpose in heredity
3. High proportion of lean in the carcass

U. Santa Gertrudis

1. Cherry red color
2. Developed in Texas by crossing beef-type Shorthorn cows and Brahman bulls
3. Most are polled
4. Loose hides with surface area increased by neck folds and sheath flaps

INFORMATION SHEET

III. Parts of the beef animal (See TM 1)

   A. Poll
   B. Neck
   C. Crops
   D. Back
   E. Loin
   F. Hooks
   G. Rump
   H. Tail head
   I. Quarter
   J. Stifle
   K. Hock
   L. Shank (cannon bone)
   M. Hoof
   N. Flank
   O. Last rib (13th)
   P. Ribs
   Q. Sheath
   R. Underline
   S. Fore flank
   T. Shank
   U. Dewclaw
   V. Coffin
   W. Pastern
   X. Fetlock
   Y. Knee
   Z. Elbow
   AA. Brisket
   BB. Shoulder
   CC. Dewlap
   DD. Shoulder vein
   EE. Muzzle
   FF. Nostril
   GG. Nose
   HH. Face
   II. Forehead
   JJ. Body

IV. Desirable Characteristics of Beef Animals

   A. Steer (See TM 2)

      1. Weigh approximately 900 to 1,200 pounds

      2. Enough size and scale to carry weight with a minimum of finish

      3. Enough finish to yield choice carcass, yet a minimum of finish to increase carcass cutability

      4. Heavy muscling in the high priced cuts (loin, round)

      5. Trim about the middle and clean fronted

   B. Breeding bull and heifer (See TM 3 & 4)

      1. Well balanced with ample size and scale

      2. Same meat type characteristics of the ideal steer

INFORMATION SHEET

3. Possess breed and sex character
4. Scale, underpinning, action, and reproductive organs should all receive emphasis

V. Classification of Beef Cattle

- A. Sex classes of cattle
    1. Steer
    2. Heifer
    3. Cow
    4. Bull
    5. Stag
- B. Age range of cattle
    1. Vealers - Cattle under three months of age
    2. Calves - Young cattle between the vealer and yearling stage
    3. Yearlings - Cattle from 12 to 24 months of age
    4. Two-year-olds - Cattle from 24 to 36 months of age
    5. Older cattle - Cattle that are over 36 months of age
- C. Use of cattle
    1. Feeder cattle
    2. Slaughter cattle

VI. Feeder Cattle Grades (See TM 5 & 6)
(Based on two criteria)

- A. Ultimate slaughter size
    1. Large
        - a. Steers may grade U.S. Choice at 1200 lbs
        - b. Heifers may grade U.S. Choice at 1000 lbs

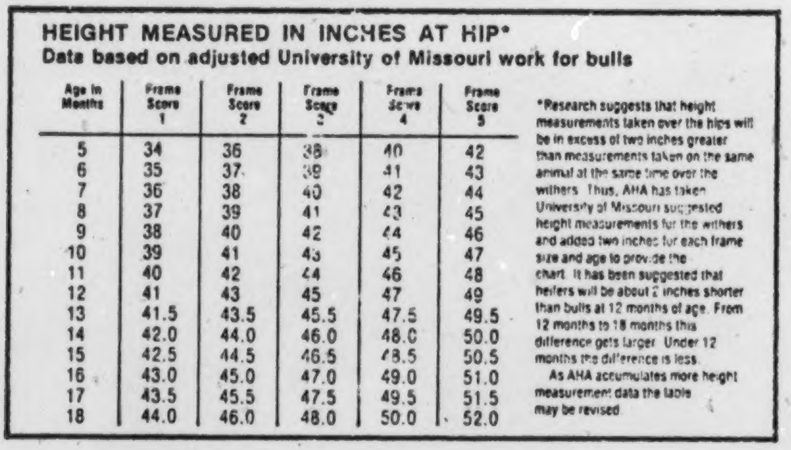
INFORMATION SHEET

2. Medium
    a. Steers may grade U.S. Choice at 1000-1200 lbs
    b. Heifers may grade U.S. Choice at 850-1000 lbs
3. Small
    a. Steers may grade U.S. Choice at less than 1000 lbs
    b. Heifers may grade U.S. Choice at less than 850 lbs

B. Muscle thickness

1. No. 1
    Show high proportion of best breeding, are thrifty, and slightly thick throughout
2. No. 2
    Thrifty and narrow through forequarters and middle part of the round
3. No. 3
    Thrifty with less thickness than minimum requirements for No.2 grade

VII. Frame Scores (See TM 6 and 7)



HEIGHT MEASURED IN INCHES AT HIP*

Data based on adjusted University of Missouri work for bulls

Age in Months	Frame Score 1	Frame Score 2	Frame Score 3	Frame Score 4	Frame Score 5
5	34	36	38	40	42
6	35	37	39	41	43
7	36	38	40	42	44
8	37	39	41	43	45
9	38	40	42	44	46
10	39	41	43	45	47
11	40	42	44	46	48
12	41	43	45	47	49
13	41.5	43.5	45.5	47.5	49.5
14	42.0	44.0	46.0	48.0	50.0
15	42.5	44.5	46.5	48.5	50.5
16	43.0	45.0	47.0	49.0	51.0
17	43.5	45.5	47.5	49.5	51.5
18	44.0	46.0	48.0	50.0	52.0

*Research suggests that height measurements taken over the hips will be in excess of two inches greater than measurements taken on the same animal at the same time over the withers. Thus, AHA has taken University of Missouri suggested height measurements for the withers and added two inches for each frame size and age to provide the chart. It has been suggested that heifers will be about 2 inches shorter than bulls at 12 months of age. From 12 months to 18 months this difference gets larger. Under 12 months the difference is less.

As AHA accumulates more height measurement data the table may be revised.

INFORMATION SHEET

1—1.0 to 1.9 should be used for those calves which are the shorter kind of cattle in every dimension of skeletal development. Calves falling anywhere in the body type 1 scores are short legged, short bodied, and very compact, and would probably reach physiological maturity* at 800 to 850 pounds.

2—2.0 to 2.9 are not as extreme, but they are generally below the breed average and are comparatively short in their skeletal development. Cattle in the 2 range would probably reach physiological maturity* at 850 to 950 pounds.

3—Cattle in the range of 3.0 to 3.9 are medium in size. They are neither extremely large nor small in their overall dimensions, and would probably reach physiological maturity* at 950 to 1,050 pounds.

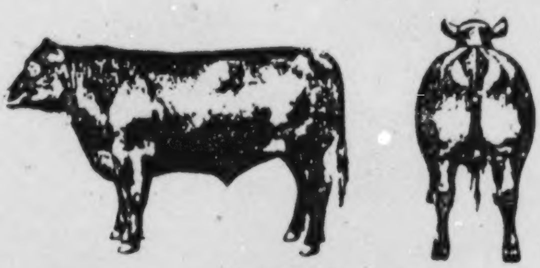
4—A score of 4.0 to 4.9 describes growthier, larger calves. Cattle in the body type 4.0 to 4.9 scores would probably reach physiological maturity* at 1,050 to 1,150 pounds.

5—5.0 to 5.9 should be used to describe the longer, taller type animals. These cattle are longer in all their dimensions and will probably reach physiological maturity* at 1,150 to 1,250 pounds.

*Physiological maturity being used in the sense that if the animal being scored were a steer, this is when the animal would have .4 inch of fat over the rib-eye between the 12th and 13th rib.

VIII. Slaughter Grades

- A. In live cattle corresponds to carcass grade
- B. Two factors to observe
  - 1. Maturity
  - 2. Quality - associated with amount of fat
- C. Slaughter grades of steers and heifers
  - 1. Prime

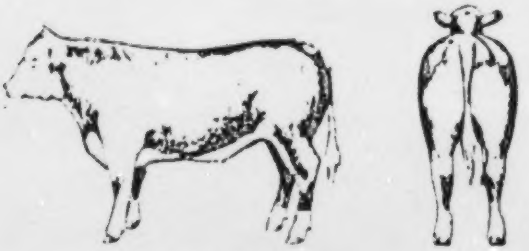


PRIME

INFORMATION SHEET

(NOTE: Slaughter cattle possessing the minimum qualifications for the Prime grade are thick muscled and tend to be low set, compact, and thickly fleshed throughout. They are wide over the back, loin, and rump. The shoulders and hips are neatly laid in and smooth. The twist is deep and full and the rounds are thick and plump. There is a pronounced fullness or bulging over the crops, loin, and rump which contributes to a smooth, iniform width of top. Steers and heifers 30 to 42 months of age have a thick fat covering over the back, ribs, loin and rump. The brisket, flanks, and cod or udder appear full and distended. The fat covering tends to be smooth with only slight indications of patchiness. Steers and heifers under 30 months of age have a moderately thick but smooth covering of fat which extends over the back, ribs, loin, and rump. The brisket, flanks, and cod or udder show a marked fullness).

2. Choice

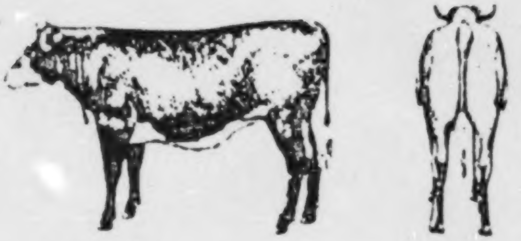


CHOICE

(NOTE: Slaughter cattle possessing minimum qualifications for the Choice grade are moderately thick muscled, tend to be moderately thick fleshed. They are moderately neat and smooth laid in with only a slight tendency toward prominence in older cattle. The twist is moderately full and the rounds are moderately thick and plump. There is a fullness or bulge distinctly evident over the crops, loin, and rump. Cattle 30 to 42 months of age have a moderately thick fat covering over the crops, back, loin, rump, and ribs. The brisket, flanks, and cod or udder show a marked fullness. Cattle under 30 months of age carry a slightly thick fat covering over the top. The brisket, flanks, and cod or udder appear moderately full).

INFORMATION SHEET

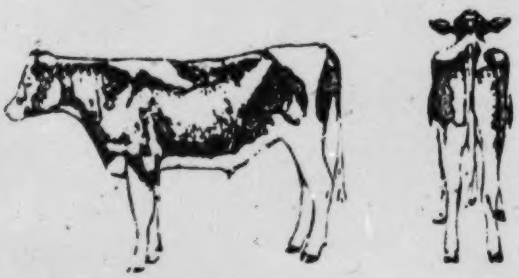
3. Good



GOOD

(NOTE: Cattle possessing minimum qualifications for the Good grade are slightly thick muscled, tend to be slightly low set and compact, and tend to be slightly thick fleshed. They are slightly wide over the back and loin. The shoulders and hips are usually moderately neat and smooth laid in but may appear slightly deep but tend to be flat with little evidence of plumpness. There is usually a very slight fullness evident over the crops, loin, and rump. Good grade cattle 30 to 48 months of age carry a slightly thin fat covering with some fullness evident in the brisket, flanks, twist, and cod or udder. Cattle under 30 months of age have a thin fat covering which is largely restricted to the back and loin. The brisket, flanks, twist, and cod or udder are slightly full).

4. Standard



STANDARD

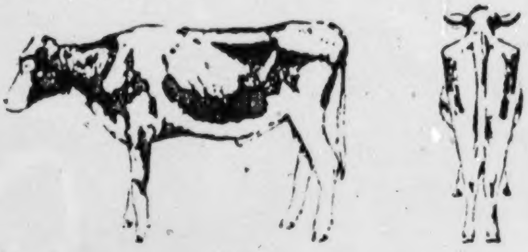
INFORMATION SHEET

(NOTE: Slaughter cattle possessing minimum qualifications for the Standard grade tend to be thinly muscled, slightly rangy, and upstanding and tend to be thinly fleshed. They are narrow through the back and loin, somewhat prominent at the hips, and shallow in the twist and rounds. The loin, rump, and rounds appear flat with no evidence of fullness. Cattle ranging from 30 to 48 months of age have a thin fat covering primarily over the back, loin, and ribs. Cattle under 30 months of age have only a very thin covering of fat which is largely restricted to the back, loin, and upper rib.)

5. Commercial

(NOTE: The Commercial grade is limited to cattle over approximately 48 months of age. Slaughter cattle possessing the minimum qualifications for Commercial tend to be thinly muscled, slightly rangy, and thinly fleshed. They appear deep through the forerib and moderately wide through the back and loin. The hips and shoulders are prominent and the rounds are thin and shallow with no appearent bulge or fullness. Slaughter cattle which slightly exceed the minimum maturity for the Commercial grade have a slightly thick fat covering over the back, ribs, loin, and rump. Very mature cattle usually have at least a moderately thick fat covering over the back, ribs, loin, and rump and considerable patchiness frequently is evident about the tailhead. The brisket, flanks, and cod or udder appear to be moderately full).

6. Utility



UTILITY

INFORMATION SHEET

(NOTE: Cattle possessing the minimum qualifications for the Utility grade are thinly muscled and tend to be rangy, upstanding, and angular. They are narrow through the crops and the loin, rump, and rounds appear slightly sunken. Shoulders and hip are decidedly prominent and the depth through the forerib is much greater than through the rear flank. The degree of finish required for the utility grade varies throughout the range of maturity permitted in this grade from a very thin covering of fat for cattle under 30 months of age to a slightly thick fat covering, generally restricted to the back, loin, and rump for the very mature cattle in this grade. In such mature cattle, the crops are slightly thin and the brisket, flanks, and cod or udder indicate very slight fullness).

7. Cutter

(NOTE: Slaughter cattle possessing the minimum qualifications for the Cutter grade are very thinly muscled and tend to be decidedly rangy, upstanding, and angular. The hips and shoulders are very prominent and the loins and rounds are very sunken. The degree of finish ranges from practically none in cattle under 30 months of age to very mature cattle which have only a very thin covering of fat.)

8. Canner

(NOTE: Canner grade cattle are those which are inferior to the minimum specified for the Cutter grade).

D. Cows

1. Choice
2. Good
3. Standard
4. Commercial
5. Utility
6. Cutter
7. Canner

INFORMATION SHEET

E. Bulls and stags

1. Choice
2. Good
3. Commercial
4. Utility
5. Cutter
6. Canner

Example: 1,000 lb. steer ÷ 100 = 10 x 1.1 sq. in. = 11.0 sq. in loin eye area.

It should be stressed that this is an average figure and steers that are heavy muscled individuals will have more than this amount and those that are light muscled will have less.

Extreme ranges in loin eye area are 7.5 sq. in. to 22.0 sq. in.

Fat thickness at the 12th Rib: Fat thickness or external fat cover is estimated at a spot over the 12th rib. This trait is estimated to the nearest 0.05 of an inch in the live animal. It is generally accepted that typical choice finished cattle will have approximately 0.1 in. of external fat at the 12th rib per 100 lb. of carcass weight.

Example: 1,000 lb. steer, dressing 60% = 600 lb. carcass, 600 lb. ÷ 100 lb. = 6 x 0.1 in. = 0.6 fat for 600 lb. choice carcass.

Again it should be stressed that this is an average figure and will vary widely from animal to animal.

Extreme range in fat thickness = 0.1 in. to 1.5 in.

IX. Yield Grade
(NOTE: Yield grade is an estimate of the percent edible portion of the four primal cuts of beef and is normally estimated to the nearest 0.1 of a yield grade).

A. Carcass traits used

1. Hot carcass weight
2. Fat thickness at the 12th rib

INFORMATION SHEET

3. Percent kidney, heart and pelvic fat

4. Loin eye area

(NOTE: An increase in the first three of the above factors causes the yield grade to increase (% yield to decrease) while an increase in the fourth factor causes the yield grade to decrease (%yield to increase)).

B. Calculation for yield grade

1. A preliminary yield grade is determined based solely on the fat thickness estimate.

Thickness of Fat Over Ribeye	Preliminary Yield Grade
0.2 in	2.5
0.4 in	3.0
0.6 in	3.5
0.8 in	4.0
1.0 in	4.5
1.2 in	5.0
1.4 in	5.5

2. Adjust the preliminary yield grade using estimates of loin eye area and carcass weight

   a. Loin eye area is partially influenced by weight of the animal and its carcass. Assuming a dressing percent of 60%, animals with average muscling would be expected to have loin eyes of the size given:

Live Wt.(lb.)	Carcass Wt.(lb.)	Loin Eye Area
667	400	8.6
750	450	9.2
833	500	9.8
917	550	10.4
1000	600	11.0
1083	650	11.6
1167	700	12.2
1250	750	12.8
1333	800	13.4
1417	850	14.0
1500	900	14.6

INFORMATION SHEET

Adjust the preliminary yield grade by 0.3 for every 1.0 sq.in change in loin eye from the average size given above. If you estimate an animal to be above average in muscling, the adjustment is subtracted from preliminary yield grade, if below average in muscling, then the adjustment is added.

3. Estimating the percent kidney in live steers is extremely difficult to accomplish with much success. Therefore, this adjustment many times is not made in estimating the yield grade of the live animal.

   a. If adjusting for percent internal fat, assume the average steer has 3.5% The adjustment factor for every 1.0% change is 0.2 of a yield grade. If internal fat is above 3.5% the adjustment factor is added. If below, the adjustment factor is subtracted.

4. Examples:

   a. Steer A

      Fat Thickness = 0.4 in.
      Loin Eye Area = 11.0 sq. in.
      (Live wt. = 1000 lb -
      Carcass wt. = 600 lb.)
      Percent Internal Fat = 3.5%

      Preliminary Yield Grade = 3.0
      Adjustment Factor = 0.0

      Adjustment Factor = 0.0
      Final Yield Grade = 3.0

   b. Steer B

      Fat Thickness = 0.4 in.
      Loin Eye Area = 12.0 sq. in.
      *(Live wt. = 833 lb -
      Carcass wt. = 500 lb.)
      Percent Internal Fat = 2.5%

      Preliminary Yield Grade = 3.0
      Adjustment Factor = -.7

      Adjustment Factor = -.2
      Final Yield Grade = 2.1

   * Estimate of Steer B's Loin Eye Area = 12.0 sq. in.
   Average Loin Eye for 500 lb. Carcass = 9.8 sq. in.
   Loin Eye Deviation = +2.2 sq. in.
   Adjustment Factor = -.7 (.3/1 sq. in. Loin Eye Area)

X. Wholesale Cuts of Beef (See TM 10)

   A. Forequarter:

      1. Chuck - 25% of the carcass

INFORMATION SHEET

    2. Brisket - 4% of the carcass
    3. Shank - 3% of the carcass
    4. Plate - 7% of the carcass
    5. Rib - 9% of the carcass

(NOTE: Beef have a dressing percentage of 55%)

B. Hindquarter

    1. Loin - 19% of the carcass
    2. Round - 20% of the carcass
    3. Rump - 4% of the carcass
    4. Hind Shank - 2% of the carcass
    5. Flank - 5% of the carcass

C. Variety Cuts

    1. Kidney
    2. Heart 2% of the carcass
    3. Tongue
    4. Liver

XI. Carcass Evaluation

A. Factors affecting quantity of red meat

    1. Fat deposition
    2. Loin eye area
    3. Conformation
    4. Carcass weight

B. Factors affecting quality of red meat

    1. Marbling
    2. Maturity
    3. Color
    4. Texture
    5. Firmness

INFORMATION SHEET

C. Two types of carcass grading

1. Quality grading determinants

   a. Maturity or psychological age of carcass

Age (months)	9	30	42	54	72
Maturity	A	B	C	D	E
Classification	←Young Cattle→		← Mature Cattle ⟶		

      i. Cattle in A and/or B maturity are eligible for Prime, Choice, Good, Standard, and Utility grades

      ii. Cattle in C,D, and E maturity are commonly graded Commercial, Utility, Cutter, or Canner

   b. Marbling

      i. Scored in the loin eye muscle at the 12th rib

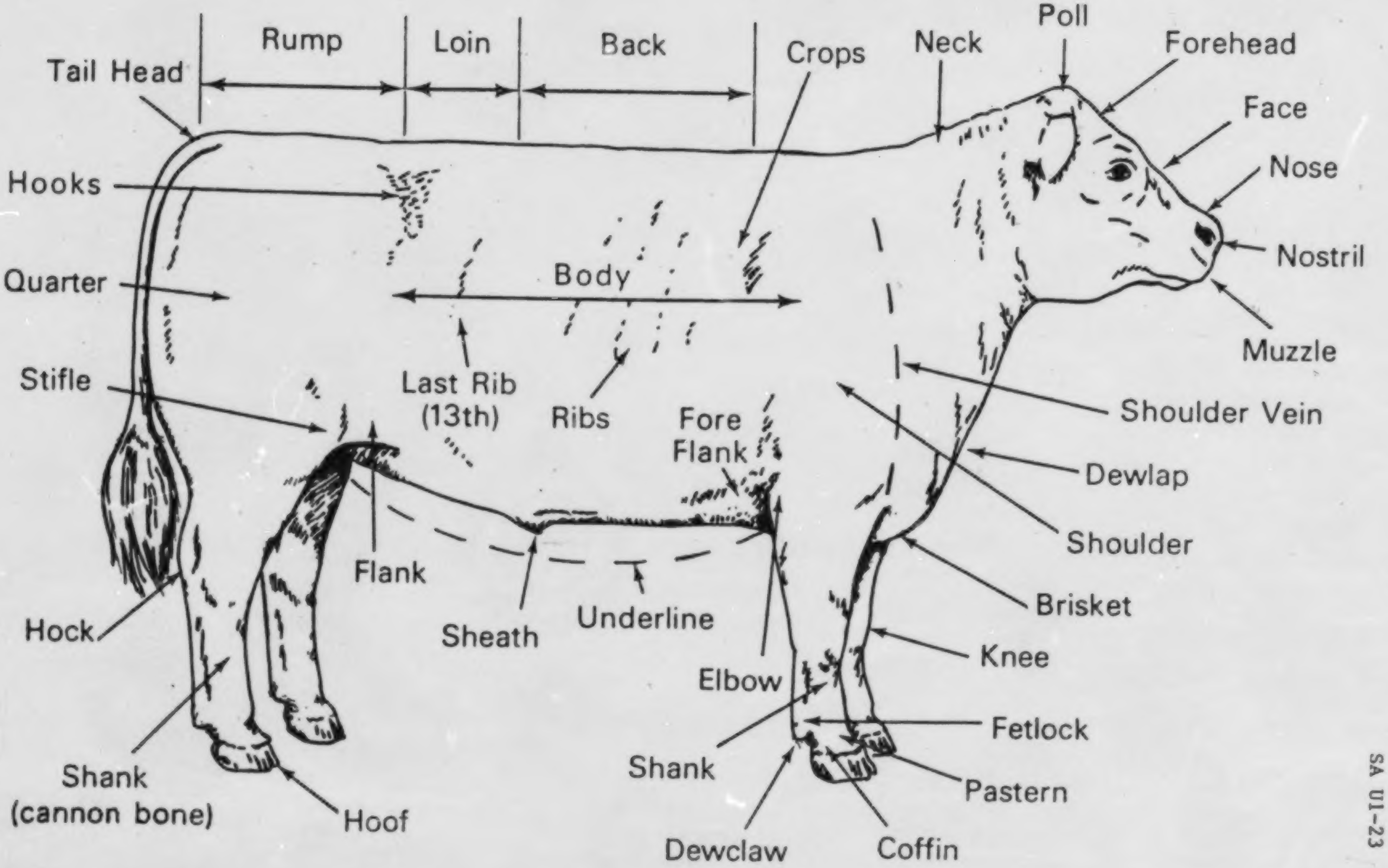
      ii. Nine degrees of marbling (See TM 12)

2. Yield grading

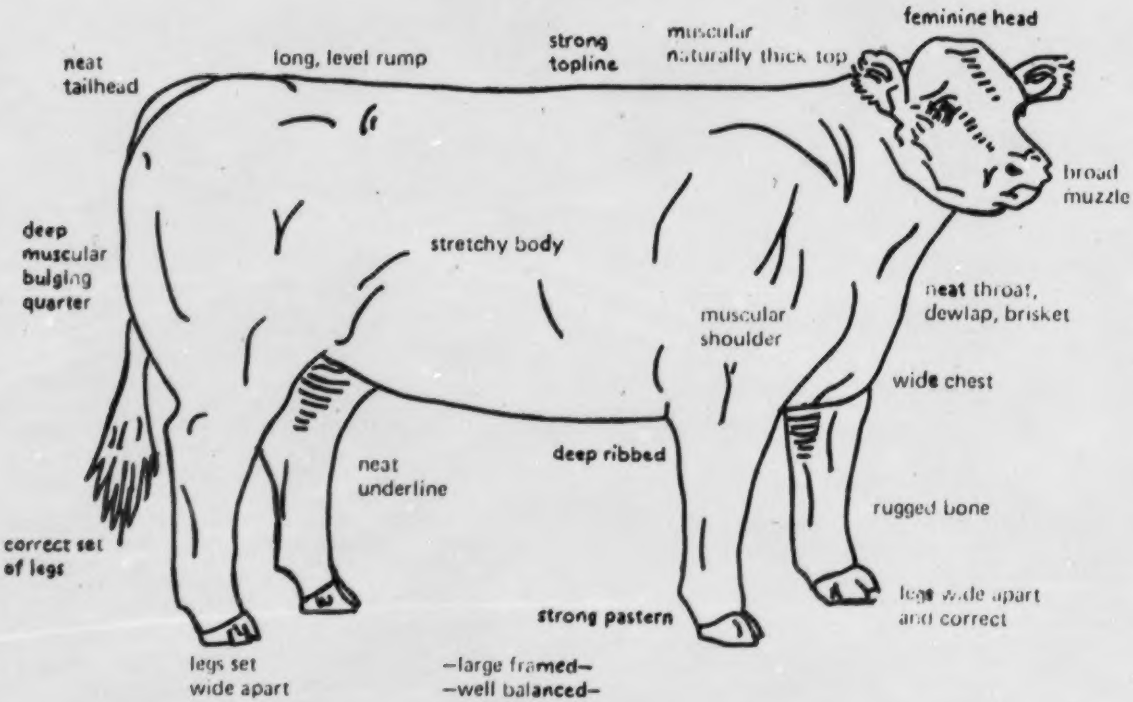
   a. Estimate of percent boneless, closely trimmed round, loin, rib, and chuck yield of the carcass

   b. Designated by numbers 1 through 5.9

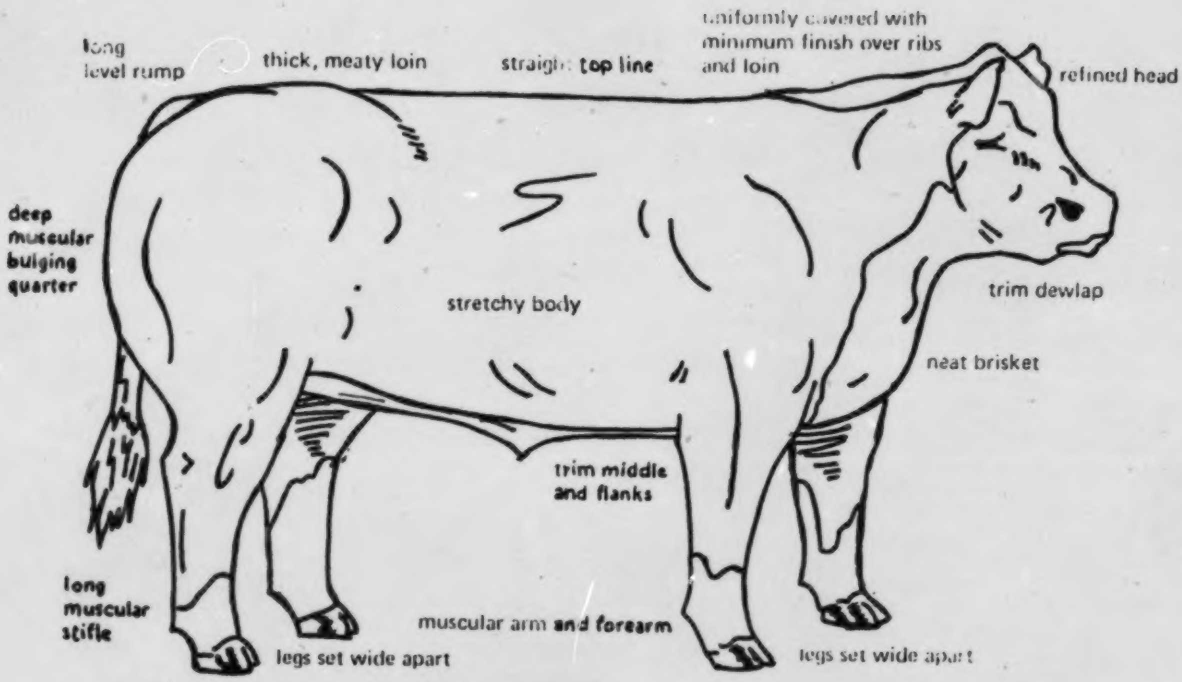
PARTS OF THE BEEF ANIMAL

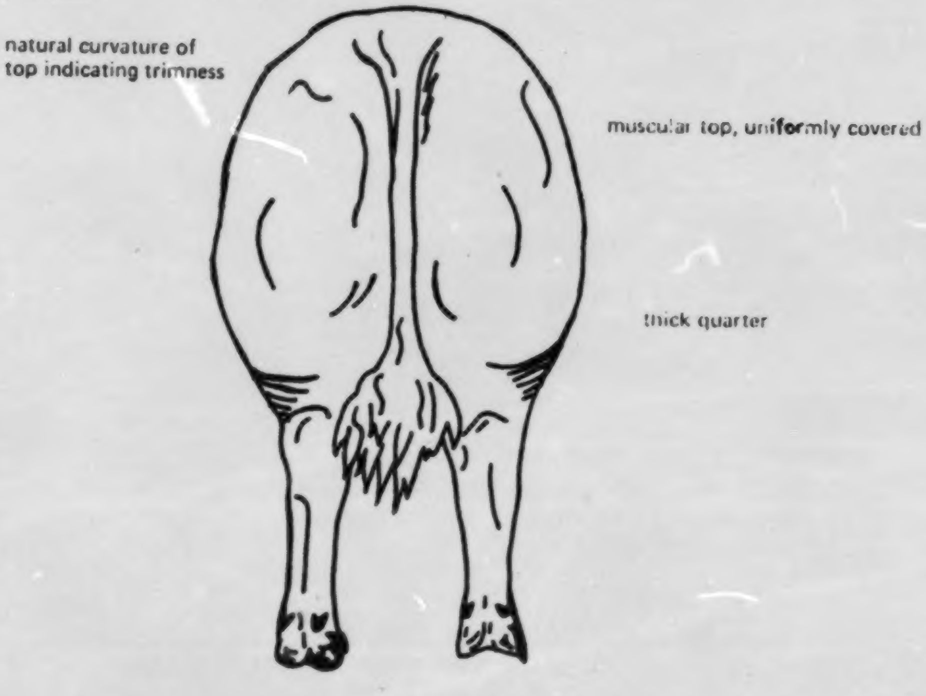


DESIREABLE CHARACTERISTICS OF A MARKET STEER

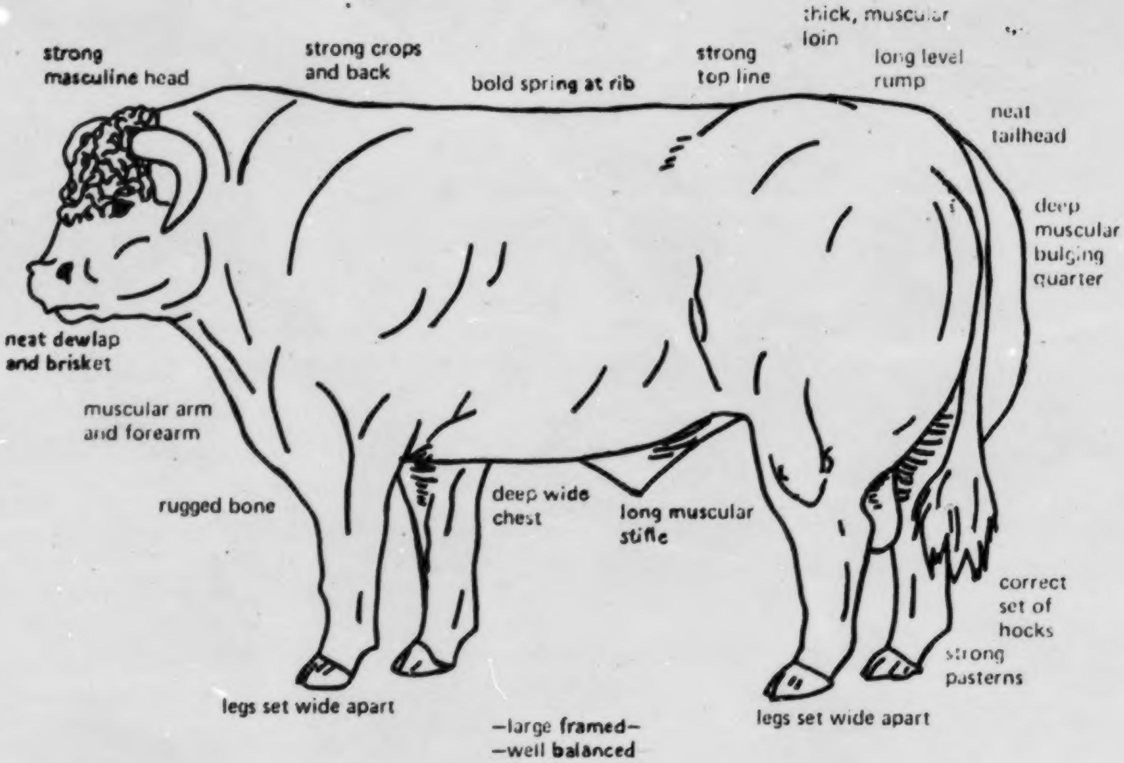


DESIREABLE CHARACTERISTICS OF A BREEDING HEIFER



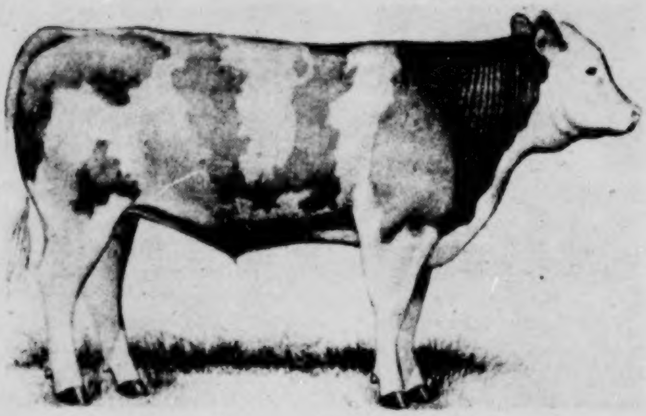


DESIREABLE CHARACTERISTICS OF A BREEDING BULL

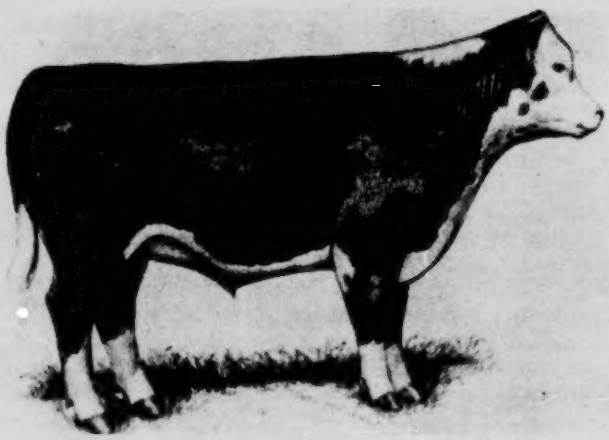


FEEDER CATTLE FRAMES

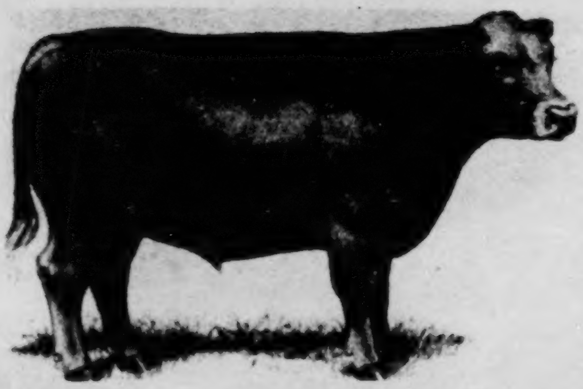
SA U1-27



Large Frame (L)—Feeder cattle which possess typical minimum qualifications for this grade are thrifty, have large frames and are tall and long bodied for their age. Steers and heifers would not be expected to produce US Choice carcasses (about 0.50 inch fat at the twelfth rib) until their live weights exceeded 1200 lbs. and 1000 lbs. respectively.



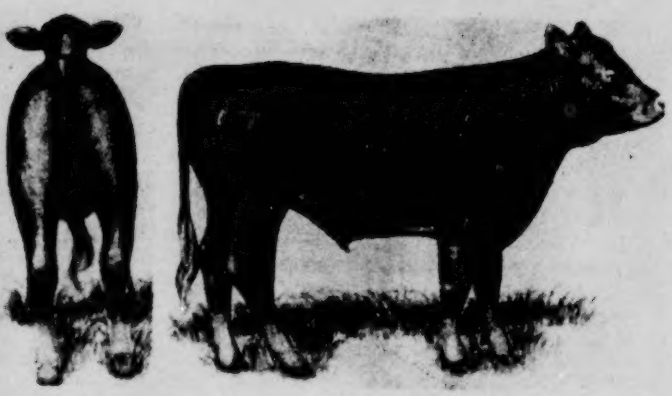
Medium Frame (M)—The feeder cattle which possess typical minimum qualifications for this grade are thrifty, have slightly large frames and are slightly tall and slightly long bodied for their age. Steers and heifers would be expected to produce US Choice carcasses (0.50 inch fat at the twelfth rib) at live weights of 1000 to 1200 lbs., and 850 to 1000 lbs., respectively.



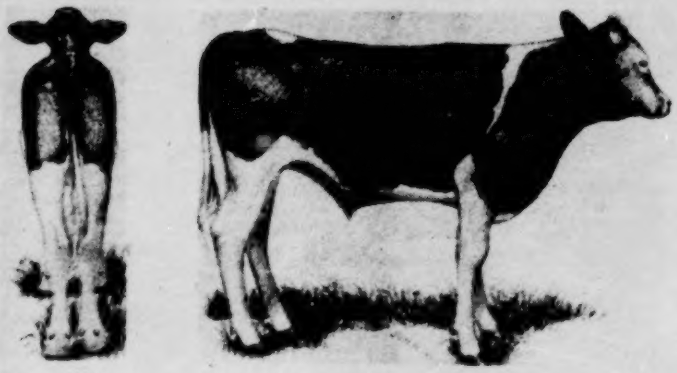
Small Frame (S)—Feeder cattle included in this grade are thrifty, have small frames and are shorter bodied and not as tall as specified as a minimum for the medium grade. Steers and heifers would be expected to produce US Choice carcasses at live weights of less than 1000 lbs. and 850 lbs., respectively.

FEEDER CATTLE THICKNESSES

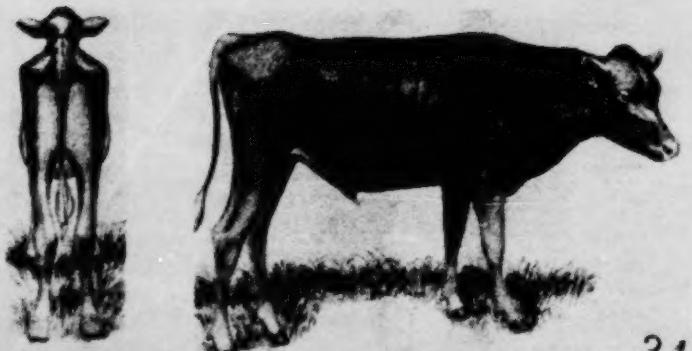
SA U1-28



No. 1 Feeder—cattle which possess minimum qualifications for this grade usually show a high proportion of beef breeding. They must be thrifty and slightly thick throughout. They are slightly thick and full in the forearm and gaskin showing a rounded appearance through the back and loin with moderate width between the legs, both front and rear. Cattle show this thickness with a slight thin covering of fat; however, cattle eligible for this grade may vary in degrees of fat.



No. 2 Feeder—cattle which possess minimum qualifications for this grade are thrifty and are narrow through the forequarters and the middle part of the rounds. The forearm and gaskins are thin and the back and loin have sunken appearance. The legs are set close together both front and rear. Cattle show this narrowness with a slight thin covering of fat; however, cattle eligible for this grade may carry varying degrees of fat.



No. 3 Feeder—cattle included in this grade are thrifty animals which have less thickness than minimum requirements specified for No. 2 grade.

(TA[illegible])

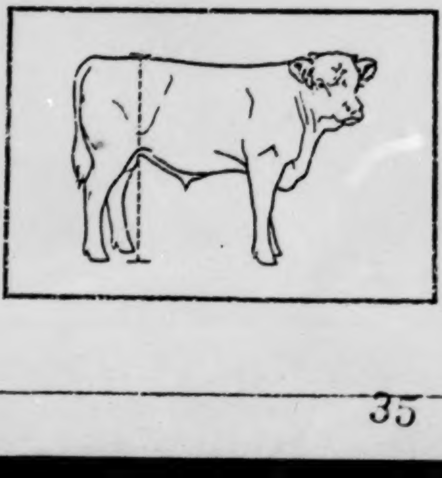
MINIMUM HIP HEIGHT MEASUREMENTS IN INCHES TO DETERMINE VARIOUS FRAME SIZES AT DIFFERENT AGES

AGE IN MONTHS	FRAME SIZE 3	FRAME SIZE 4	FRAME SIZE 5	FRAME SIZE 6
6	39	41	43	45
7	40	42	44	46
8	41	43	45	47
9	42	44	46	48
10	43	45	47	49
11	44	46	48	50
12	45	47	49	51
13	45.5	47.5	49.5	51.5
14	46	48	50	52
15	46.5	48.5	50.5	52.5
16	47	49	51	53
17	47.5	49.5	51.5	53.5
18	48	50	52	54
19	48.25	50.25	52.25	54.25
20	48.2	50.5	52.5	54.5
21	48.75	50.75	52.75	54.75
22	49	51	53	55
23	49.25	51.25	53.25	55.25
24	49.5	51.5	53.5	55.5

*Research suggest that heifers will be about 2 inches shorter than bulls at 12 months of age. Under 12 months the difference is less than 2 inches.

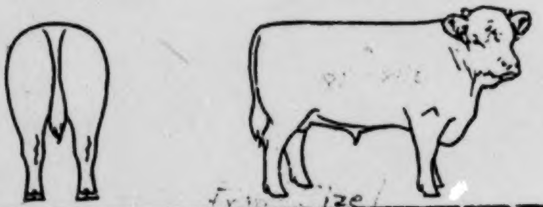
**The height in inches shown under each frame size is the minimum height for that frame size. Example: Height for frame size 4 at 12 months ranges from a minimum of 47" to a maximum of 48.9".

CALF HEIGHT—H

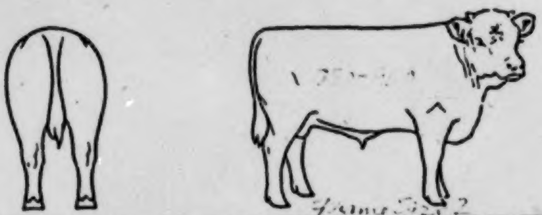


to measure the height of his calves at weaning. Height measurements should be taken over the hips (recorded to the nearest inch) when the animal is standing as near normal as possible (see diagram).

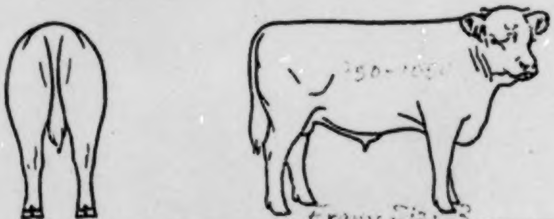
(TN7)



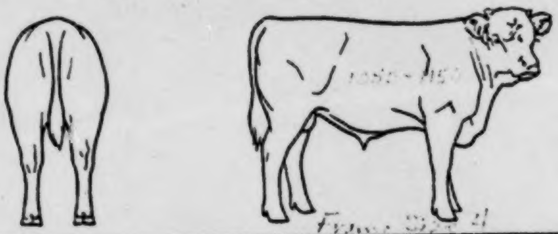
BODY TYPE 1



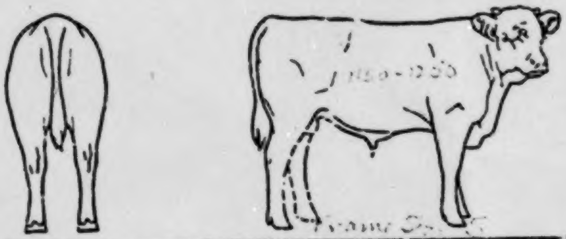
BODY TYPE 2



BODY TYPE 3

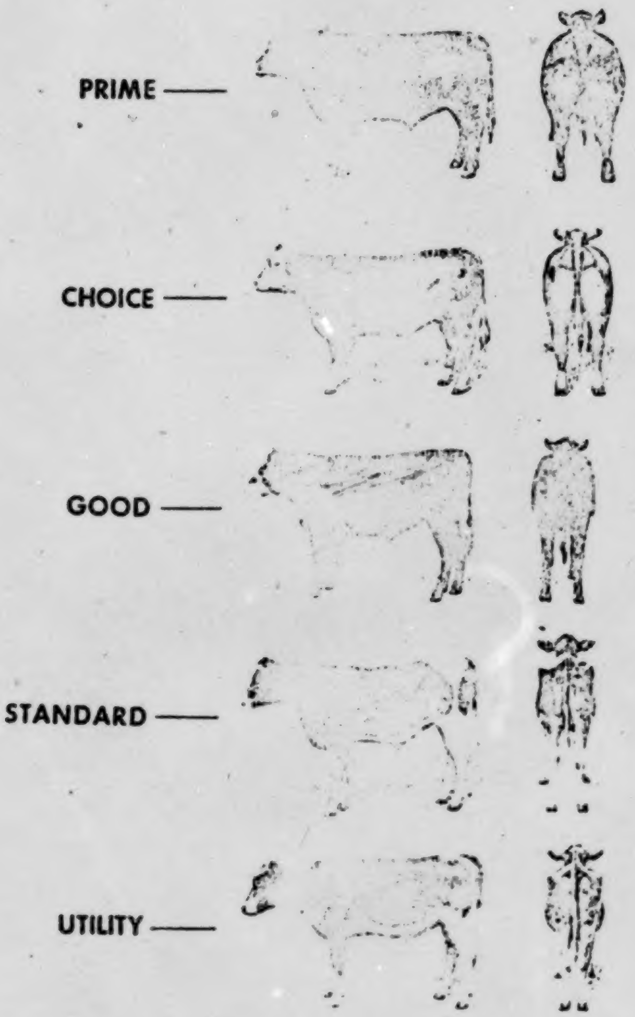


BODY TYPE 4



BODY TYPE 5

SLAUGHTER STEERS
U.S. GRADES
(QUALITY)



COMMERCIAL, CUTTER, AND
CANNER GRADES ARE OMITTED

COPIES OF THE OFFICIAL
UNITED STATES STANDARDS
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ON REQUEST

UNITED STATES DEPARTMENT OF AGRICULTURE
CONSUMER AND MARKETING SERVICE
LIVESTOCK DIVISION
WASHINGTON, D.C.

AUGUST [illegible]

Slaughter quality grades for steers

TM

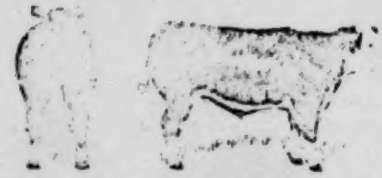
SD 01-27

SLAUGHTER STEERS

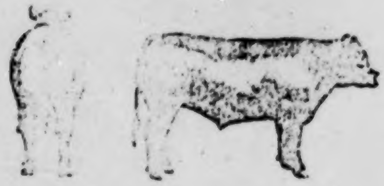
U.S. GRADES

(YIELD)

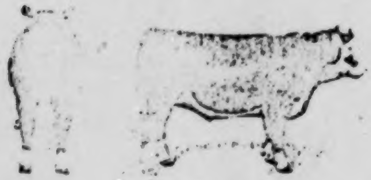
YIELD GRADE 1 —



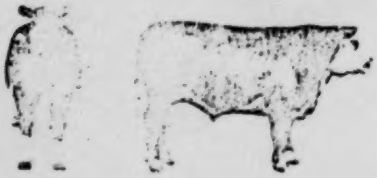
YIELD GRADE 2 —



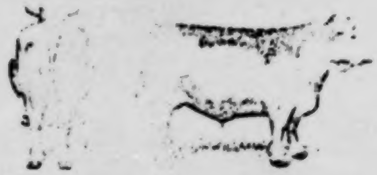
YIELD GRADE 3 —



YIELD GRADE 4 —



YIELD GRADE 5 —



COPIES OF THE OFFICIAL
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OF GRADE ARE AVAILABLE
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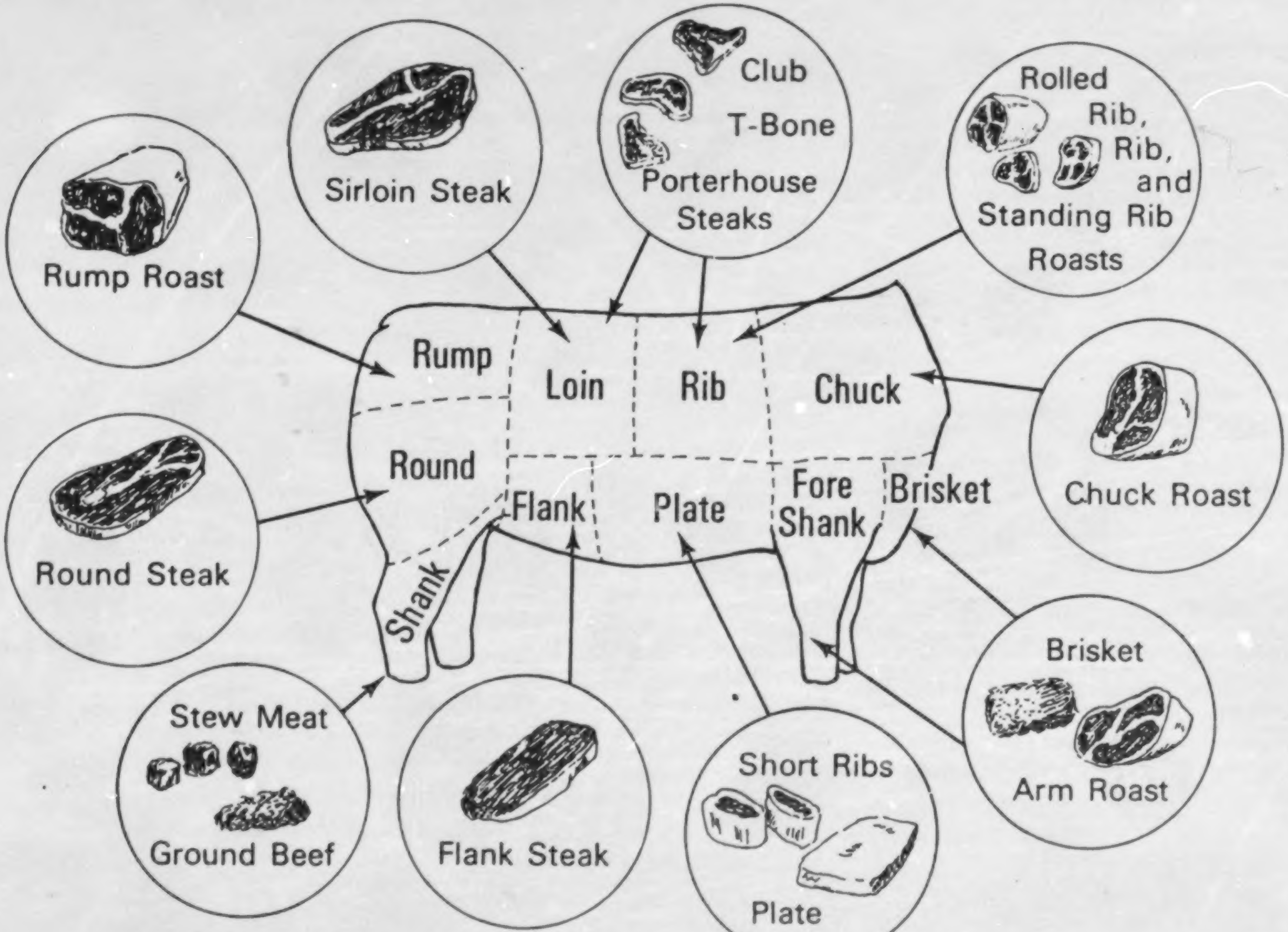
CONSUMER AND MARKETING SERVICE
LIVESTOCK DIVISION
WASHINGTON, D.C.

AUGUST 19[illegible]

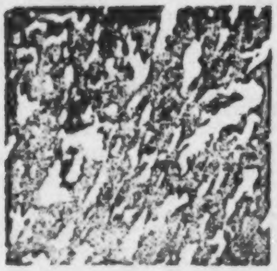
USDA

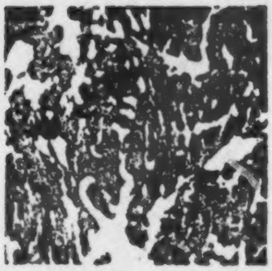
Slaughter Yield grades for steers

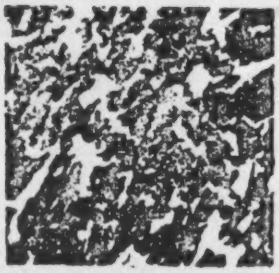
WHOLESALE CUTS OF BEEF

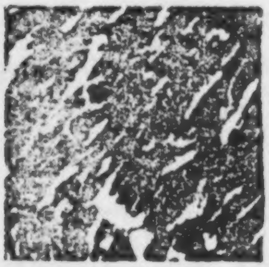


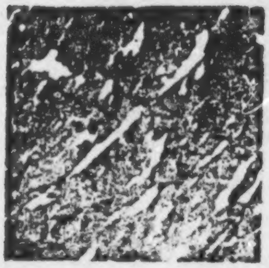
NINE DEGREES OF MARBLING IN BEEF CARCASSES

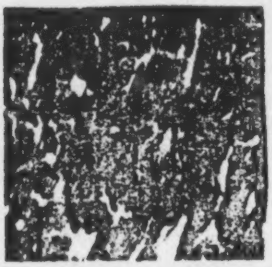

1-Very Abundant

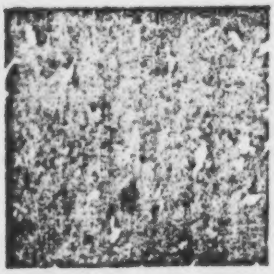

2-Abundant

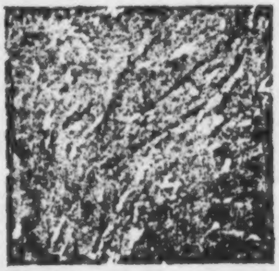

3-Moderately Abundant

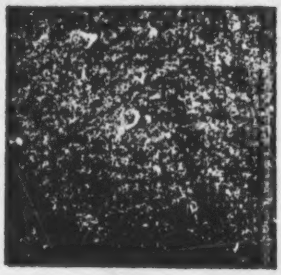

4-Slightly Abundant


5-Moderate


6-Modest


7-Small


8-Slight


9-Traces

LIVESTOCK TYPES

UNIT I

TEST

1. Match the terms on the left to the correct definition.

_____1. Conformation

_____2. Feed efficiency

_____3. Feeder calf

_____4. Hybrid

_____5. Bull

_____6. Stag

_____7. Stocker calf

_____8. Polled

a. Castrated male that reached sexual maturity prior to castration

b. Amount of feed required to produce a unit of gain in weight

c. Naturally or genetically hornless

d. Physical form of an animal

e. Bovine male of breeding age.

f. Offspring of genetically unlike parents

g. Calf purchased to go directly into the feedlot

h. Calf purchased to go to farm or ranch to grow before it goes to a feedlot or is developed as a breeding animal

2. Match the beef breeds on the left to their correct characteristics.

_____1. Shorthorn

_____2. Beefmaster

_____3. Red Angus

_____4. Angus

_____5. Galloway

_____6. Santa Gertrudis

_____7. Scotch Highland

_____8. Hereford

_____9. Charolais

_____10. Brangus

a. Polled and black in color.

b. Small, very hardy, with long yellow hair.

c. Three-way cross of Brahman, Hereford and Shorthorn.

d. 5/8 Angus and 3/8 Brahman

e. Developed in Texas by crossing Shorthorn cows with Brahman bulls.

f. Red, white, roan, or red and white.

g. Big, heavy-muscled, white breed.

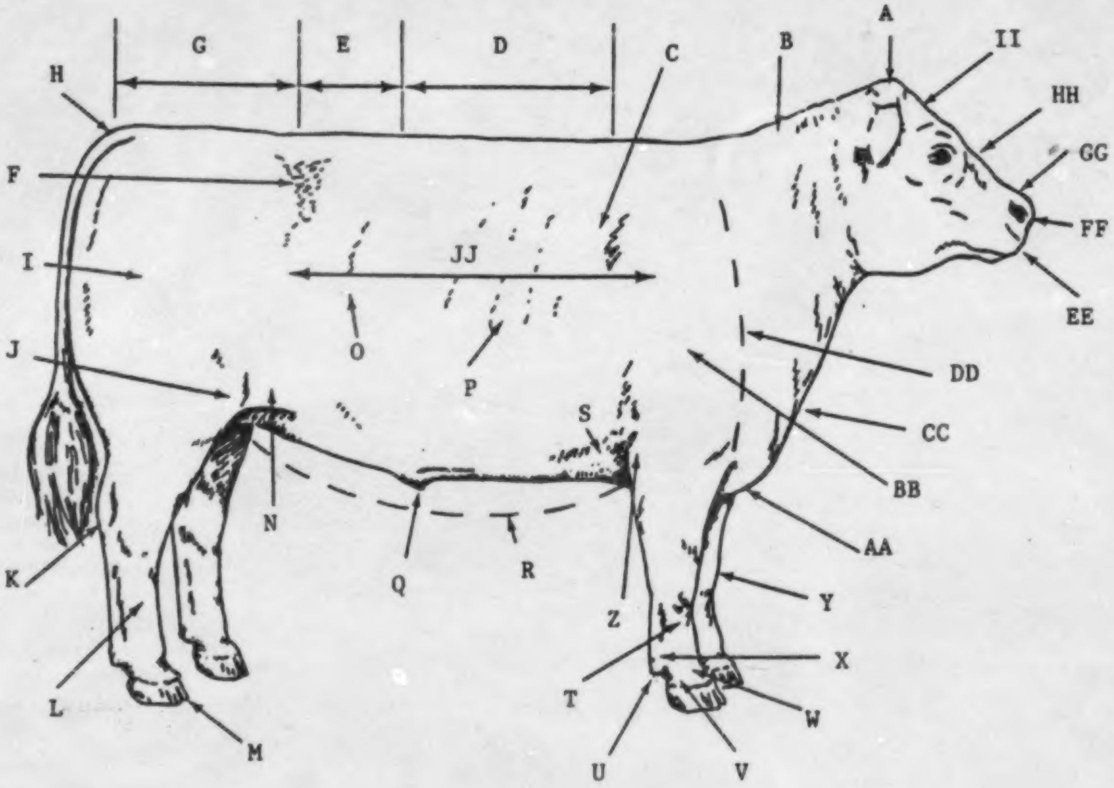
h. White-face

i. Black Angus crossed with red Longhorns

j. Polled with long black hair.

TEST

3. Identify parts of the beef animal.



A.________________
B.________________
C.________________
D.________________
E.________________
F.________________
G.________________
H.________________
I.________________
J.________________
K.________________
L.________________

M.________________
N.________________
O.________________
P.________________
Q.________________
R.________________
S.________________
T.________________
U.________________
V.________________
W.________________
X.________________

Y.________________
Z.________________
AA.________________
BB._______ _______
CC.________________
DD.________________
EE.________________
FF.________________
GG.________________
HH.________________
II.________________
JJ.________________

TEST

4. Name two desirable characteristics of a market steer and two of a breeding beef animal.

   a. Market steer

      1.

      2.

   b. Breeding beef animal

      1.

      2.

5. List three areas of classification of beef cattle.

   a.

   b.

   c.

6. List two criteria on which feeder cattle grades are based.

   a.

   b.

7. Calculate the exact frame score for a 13 month old steer that is 50.5 inches tall at the hip (see TM 7)

8. List in order the eight slaughter grades of beef cattle.

   a.

   b.

   c.

   d.

   e.

TEST

f.

g.

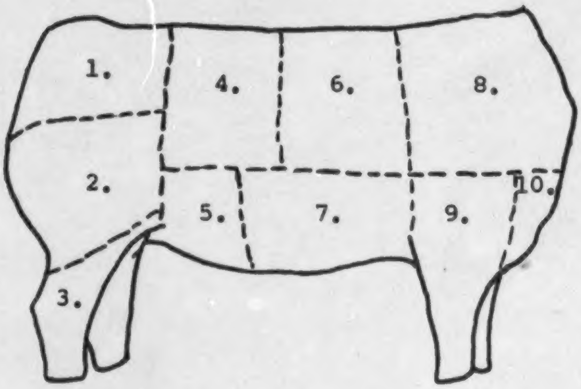
h.

9. Calculate the yield grade of a steer that has:

Fat thickness = 0.4 in.
Loin eye area = 10.0 sq. in.
(Live wt. = 1167 lb - Carcass wt. = 700 lb)
Percent Internal Fat = 4.5%

Preliminary Yield Grade ______________
Adjustment Factor ______________
Adjustment Factor ______________
Final Yield Grade

10. Identify the wholesale cuts of beef.



1. ______________
2. ______________
3. ______________
4. ______________
5. ______________
6. ______________
7. ______________
8. ______________
9. ______________
10. ______________

11. List the nine factors affecting the quantity and quality of beef carcasses.

Quantity	Quality
a.	a.
b.	b.
c.	c.
d.	d.
	e.

LIVESTOCK TYPES

UNIT I

ANSWERS TO TEST

1.
   1. d
   2. b
   3. g
   4. f
   5. e
   6. a
   7. h
   8. c

2.
   a. 4
   b. 7
   c. 2
   d. 10
   e. 6
   f. 1
   g. 9
   h. 8
   i. 3
   j. 5

3.
   A. Poll
   B. Neck
   C. Crops
   D. Back
   E. Loin
   F. Hooks
   G. Rump
   H. Tail head
   I. Quarter
   J. Stifle
   K. Hock
   L. Shank (cannon bone)
   M. Hoof
   N. Flank
   O. Last rib (13th)
   P. Ribs
   Q. Sheath
   R. Underline
   S. Fore flank
   T. Shank
   U. Dewclaw
   V. Coffin
   W. Pastern
   X. Fetlock
   Y. Knee
   Z. Elbow
   AA. Brisket
   BB. Shoulder
   CC. Dewlap
   DD. Shoulder vein
   EE. Muzzle
   FF. Nostril
   GG. Nose
   HH. Face
   II. Forehead
   JJ. Body

4. a. Any two of the following:
   1. Weigh about 900 to 1,200 pounds
   2. Enough size and scale to carry weight with a minimum of finish
   3. Enough finish to yield choice, yet a minimum of finish to increase cutability

ANSWERS TO TEST

        4. Heavy muscling in the high priced cuts
        5. Trim about the middle and clean fronted
    b. Any two of the following:
        1. Well balanced with ample size and scale
        2. Meat type characteristics of a market animal
        3. Possess breed and sex character
        4. Have scale, underpinning, action, and good reproductive organs.

5. a. Sex
    b. Age
    c. Use

6. a. Ultimate slaughter size
    b. Muscle thickness

7. 5.5

8. a. Prime
    b. Choice
    c. Good
    d. Standard
    e. Commercial
    f. Utility
    g. Cutter
    h. Canner

9. Preliminary yield grade = 3.0
    Adjustment Factor = +.7
    Adjustment Factor = +.2
    Final yield grade = 3.9

10. 1. Rump
    2. Round
    3. Shank
    4. Loin
    5. Flank
    6. Rib
    7. Plate
    8. Chuck
    9. Fore Shank
    10. Brisket

ANSWERS TO TEST

11.

Quantity	Quality
a. Fat deposition	a. Marbling
b. Loin eye area	b. Maturity
c. Conformation	c. Color
d. Carcass wt.	d. Texture
	e. Firmness

LIVESTOCK TYPES

UNIT II

TYPES OF SWINE

TERMINAL OBJECTIVE

Upon completion of this unit, students will be able to identify and select swine breeds for breeding, identify desirable characteristics and carry out performance testing and certification of swine. This knowledge will be evidenced through demonstration and by scoring 85 percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, students will be able to:

1. Match terms associated with swine to their correct definitions
2. Match swine breeds to their correct characteristics
3. Identify as true or false statements concerning desirable characteristics of swine
4. Identify the parts of a swine
5. List five traits considered in determining swine slaughter grades
6. Identify pork carcass selection factors as being a quantity or quality factor
7. List the wholesale cuts of pork
8. List three swine carcass traits
9. Name four swine breeds with a breed association registry

LIVESTOCK TYPES

UNIT II

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheet
2. Provide students with Information and Assignment Sheets
3. Make transparencies
4. Discuss Terminal and Specific Objectives
5. Discuss Information and Assignment Sheets
6. Introduce unit by explaining terminology provided on the Information Sheet
7. Use pictures of breeds, if available, when presenting breed characteristics
8. Assist students with completing Assignment Sheets
9. Give Test

Students:

1. Read Objective Sheet
2. Study Information Sheet
3. Complete Assignment Sheets
4. Take Test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objective Sheet
2. Information Sheets

INSTRUCTIONAL MATERIALS

3. Transparency Masters

   TM 1 - INDIVIDUAL SWINE BREED CHARACTERISTICS

   TM 2 - DESIRABLE MARKET SWINE CHARACTERISTICS

   TM 3 - DESIRABLE BREEDING GILT CHARACTERISTICS

   TM 4 - PARTS OF A SWINE

   TM 5 - SLAUGHTER GRADES FOR SWINE

   TM 6 - WHOLESALE CUTS OF PORK

4. Test

5. Answers to Test

References:

1. Bogart, Ralph. Scientific Farm Animal Production. Minneapolis: Burgess Publishing Company 1977.

2. Hunsley, Roger E, Beeson, W.Malcolm; and Nordby, Julius E. Livestock Judging, Selection, and Evaluation. Danville, Illinois: The Interstate Printers and Publishers Inc. 1978.

3. Pond, W.G. and Maner J.H. Swine Production in Temperate and Tropical Environments. San Francisco: W.H. Freeman and Company, 1974.

4. Able, Bill V.; Allen, Dell M; Hines, Robert H.; and McKee, Miles. Animal Science and Industry Laboratory Manual. Dubuque, Iowa; Kendall/Hunt Publishing Company, 1978.

5. Doane's Farm Management Guide. St. Louis: Doane Agricultural Services, Inc., 1980.

6. Breeds of Swine. Washington: U.S. Government Printing Office, USDA Farmer's Bulletin No. 1263, 1973.

7. Pork Industry Handbook. Manhattan, Kansas: Cooperative Extension Service, Kansas State University.

LIVESTOCK TYPES

UNIT II

INFORMATION SHEET

I. Terms and Definitions

A. Barrow - A male porcine that was castrated prior to reaching puberty

B. Gilt - A female porcine prior to the time that she has produced her first litter

C. Boar - An intact male porcine

D. Sow - A female porcine that has produced a litter of pigs

E. Dam - Mother (all species)

F. Sire - Father (all species)

G. Farrow - To give multiple birth

H. Feed Efficiency - The amount of gain made per unit of feed

I. Litter - Young by multiparous females

J. Marbling - Distribution of fat in muscular tissue

K. Weaning - Separation of mother from offspring

L. PSE - Unacceptable pork that is Pale in color, Soft in muscle, and Exudative, losing water from the muscle.

M. Shoat - 60-125 lb. pig

N. Prolific - Ability to produce above average litter size

II. Swine Breed Characteristics

A. Berkshire

1. Black with six white points (Face, four feet, tail tip)

2. Erect ears medium in size

3. Dished face that is short and broad

4. Average rate of gain

5. One of least prolific breeds

6. Sound, aggressive and good mothers

INFORMATION SHEET

B. Chester White
   1. White color
   2. Small lop ears
   3. Poor growth rate and feed efficiency
   4. Sound footed and aggressive in breeding
   5. Excellent carcass breed

C. Duroc
   1. Red to cherry red in color
   2. Lop ears
   3. Popular because of its ability to grow and perform
   4. Good litter size
   5. Some problems with structural soundness in front legs
   6. Lacks libido (aggressiveness)

D. Hampshire
   1. Black with white belt encircling the body at shoulders
   2. Erect ears
   3. Carcass traits good - good muscling
   4. Size above average
   5. Problem with boars not being libido

E. Landrace
   1. White
   2. Large lop ears
   3. Boars are aggressive and the sows are good mothers
   4. Prolific
   5. Poor growth rate and feed efficiency

INFORMATION SHEET

F. Poland China
   1. Black with six white points
   2. Lop ears
   3. Not prolific
   4. Large ham

G. Spots
   1. 50% black and 50% white
   2. Lop ears
   3. Derived from same original stock as Poland China
   4. More prolific than Poland China
   5. Aggressive boars

H. Yorkshire
   1. White in color
   2. Erect ears
   3. Very prolific
   4. Called "Mother Breed" - good mothers
   5. Second in growth rate after Duroc
   6. Most popular breed in the U.S.
   7. Excellent for cross-breeding

III. Desirable Characteristics of Swine

A. Market Barrows
   1. Weighs 210-240 lbs
   2. Meets meat-type hog certification standards
      a. Minimum length of 29.5 inches
      b. Less than 1.5 inches of backfat
      c. Greater than 4.5 sq. in. of loin eye area

INFORMATION SHEET

   3. Clean down the top with abundance of muscling in the ham and loin region

B. Breeding gilts

   1. Same image as market barrow

   2. Also emphasize size for age, underpinning, and mammary system

C. Boar

   1. Size and scale

   2. Aggressive

   3. Reproductive tract produces viable sperm

IV. Parts of a Swine (See TM 4)

A. Poll

B. Neck

C. Shoulder

D. Back

E. Loin

F. Rump

G. Tail

H. Ham

I. Stifle

J. Hock

K. Hindleg

L. Dewclaw

M. Hind Flank

N. Sheath

O. Belly

P. Fore Flank

Q. Knee

R. Foreleg

S. Coffin

T. Pastern

U. Fetlock

V. Jowl

W. Cheek

X. Nostril

Y. Snout

Z. Ear

AA. Side

V. Swine slaughter grades

A. Feeder pig and slaughter hog U.S. grades

   1. U.S. #1

   2. U.S. #2

   3. U.S. #3

INFORMATION SHEET

- 4. U.S. #4
- 5. U.S. Utility

B. Traits considered in market swine evaluation

- 1. Live weight
- 2. Backfat thickness
- 3. Dressing percent
- 4. Carcass length
- 5. Loin eye area
- 6. Percent trimmed ham and loin

VI. Pork Carcass Selection

A. Quantity of muscle (yield)

- 1. More important than quality
- 2. Determined by four factors
  - a. Backfat thickness - most important
  - b. Loin eye area
  - c. Conformation
  - d. Carcass weight

B. Quality of muscle

- 1. As long as not PSE, considered acceptable quality
- 2. Quality factors
  - a. Firmness - most important
  - b. Marbling
  - c. Color - pinkish grey desirable
  - d. Maturity
  - e. Texture

INFORMATION SHEET

VII. Wholesale Cuts of Pork (See TM 6)

   A. Jowl

   B. Boston Buff

   C. Picnic

   D. Back

   E. Side

   F. Loin

   G. Rump

   H. Ham

VIII. Carcass Traits

   A. Often used as indicators of muscle quality since the loin eye is not always exposed

   B. Thickness and firmness of belly

      1. Evaluated by grasping and twisting the belly

   C. Feathering

      1. Fat streaking in the intercostal muscles of the rib cage

      2. The more feathering present, the more marbling in the carcass muscle

   D. Color of lean

      1. Evaluated in the intercostal muscles of the rib cage

      2. A protective membrane covers these intercostal muscles, thus color is not changed due to the drying out of the lean by overexposure to air

IX. Breed Registry

   A. Write to individual breed associations for requirements

   B. U.S. registry associations breeds

      1. American Landrace

      2. Berkshire

      3. Chester White

INFORMATION SHEET

4. Duroc
5. Hampshire
6. Hereford
7. Inbred Breeds
8. OIC (Ohio Improved Chester)
9. Poland China
10. Red Berkshire
11. Spots
12. Tamworth
13. Wessex Saddleback
14. Yorkshire

X. Purchasing Breeding Stock

A. Considerations

1. Breed
2. Age
3. Source
4. Grade or purebred

B. Age

1. Insure maturity at necessary breeding time
2. Longevity

C. Sources of breeding stock

1. Established pure-bred breeder
2. FFA or 4H swine project
3. Grade gilts from a respected producer
4. SPF - Specific pathogen free
5. On farm selected replacements

INFORMATION SHEET

D. What to look for

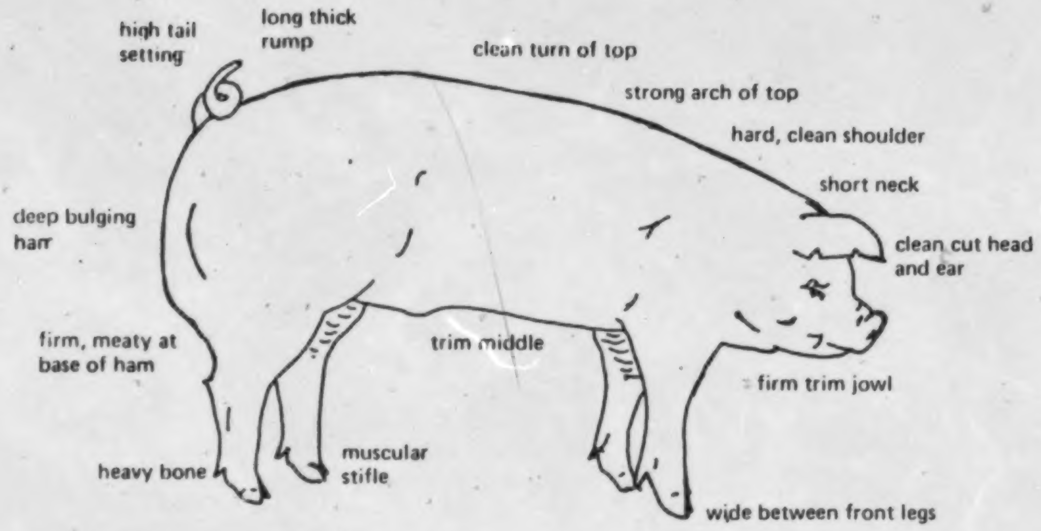
1. Animals reared in an environment comparable to your own
2. Pedigree and production records
3. Healthy animals - don't make someone else's problems your problems
4. Use superior animals - average breeding stock will get you "no-where"

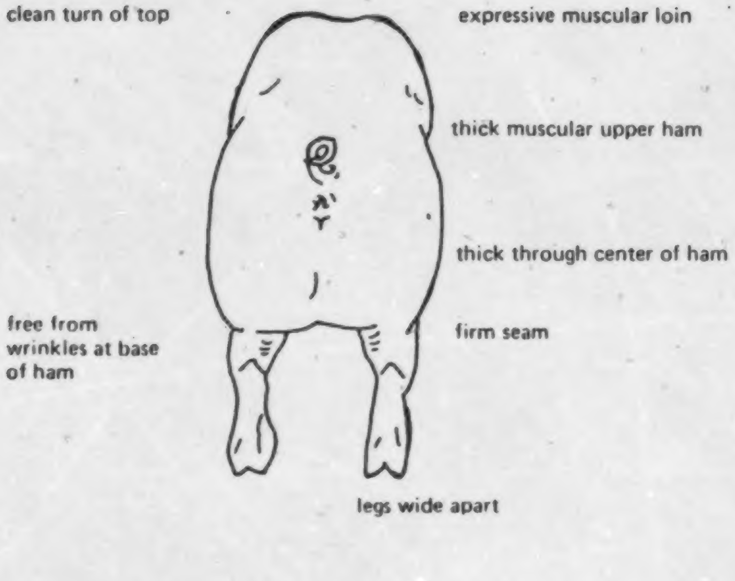
INDIVIDUAL SWINE BREED CHARACTERISTICS

	Mothering Ability	Litter Size	Growth Rate	Feed Efficiency	Carcass Quality
Berkshire	G	F	G	G	F
Chester White	E	E	G	G	G
Duroc	G	E	E	E	G
Hampshire	G	G	G	G	G+
Landrace	E	E	G	G	F
Poland China	G-	F	G	G	G+
Spots	G	G	G+	G	G
Yorkshire	E	E	G+	G+	G

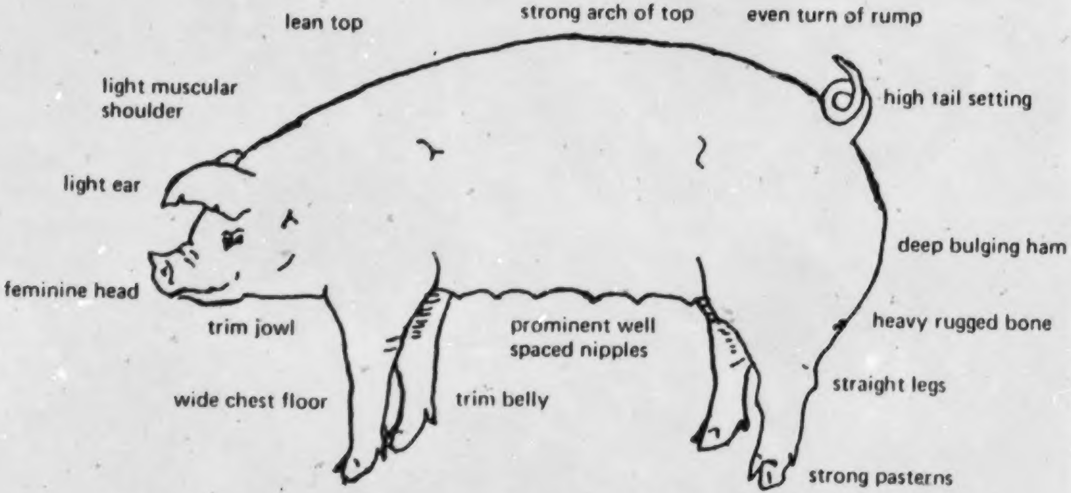
E = Excellent G = Good F = Fair

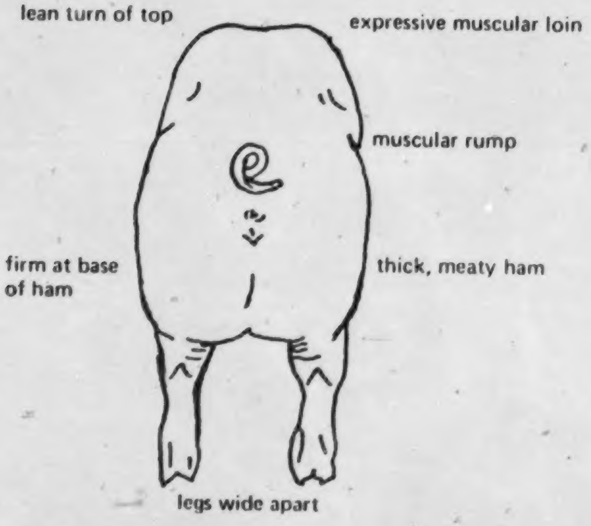
DESIRABLE MARKET SWINE CHARACTERISTICS



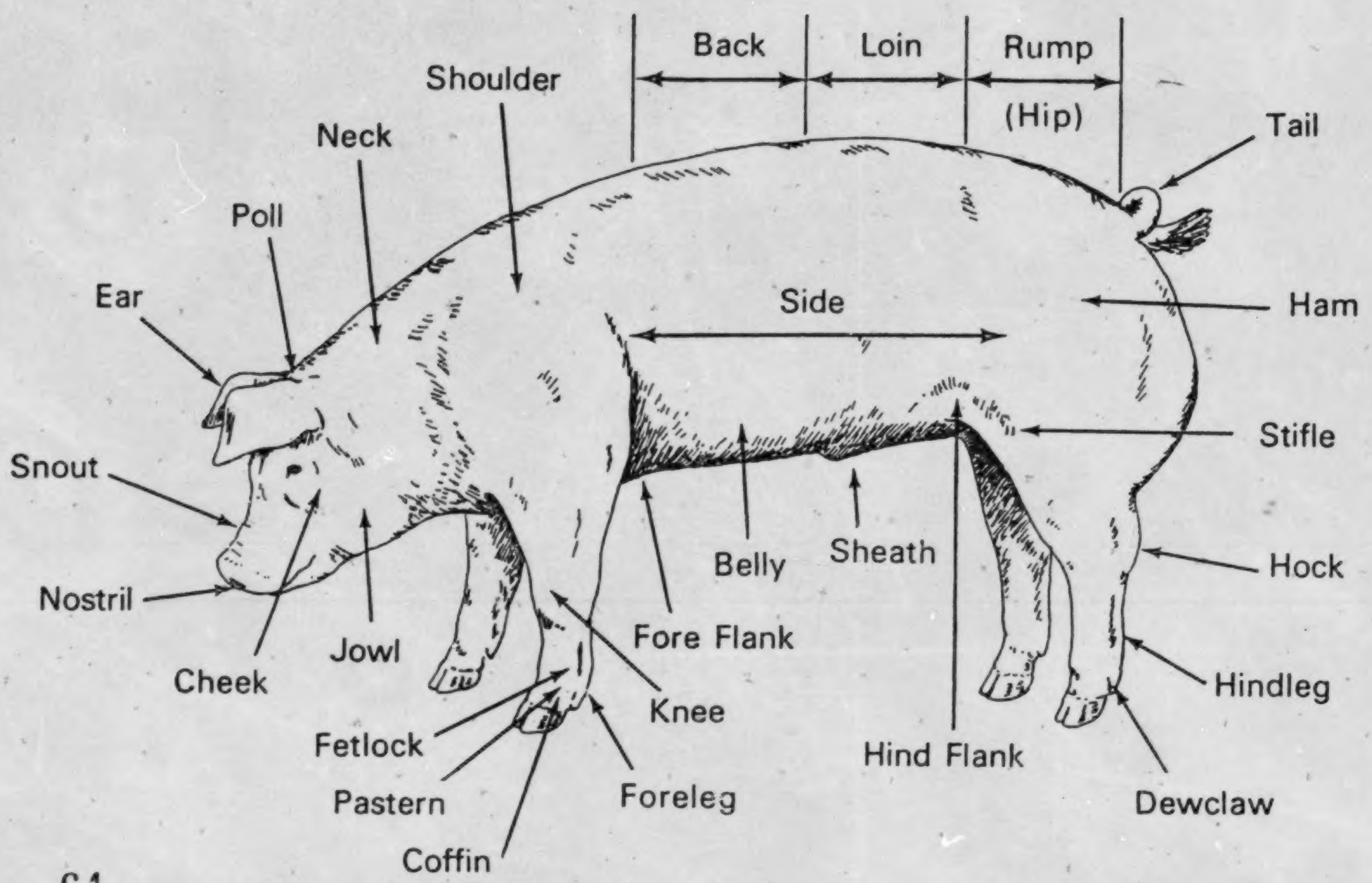


DESIRABLE BREEDING GILT CHARACTERISTICS

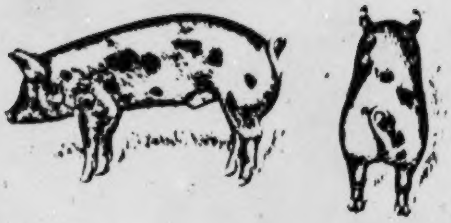




PARTS OF SWINE



SLAUGHTER GRADES FOR SWINE



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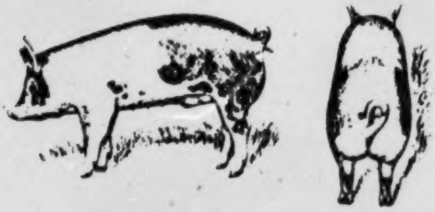

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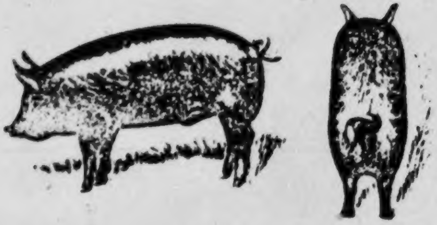

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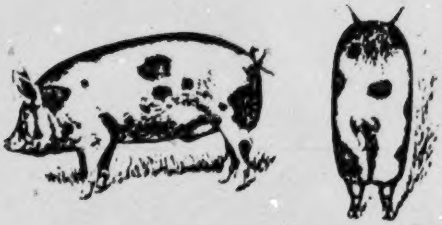

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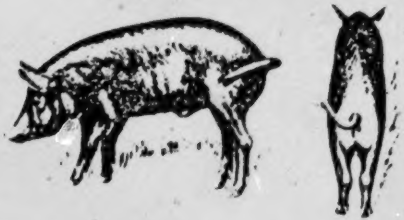
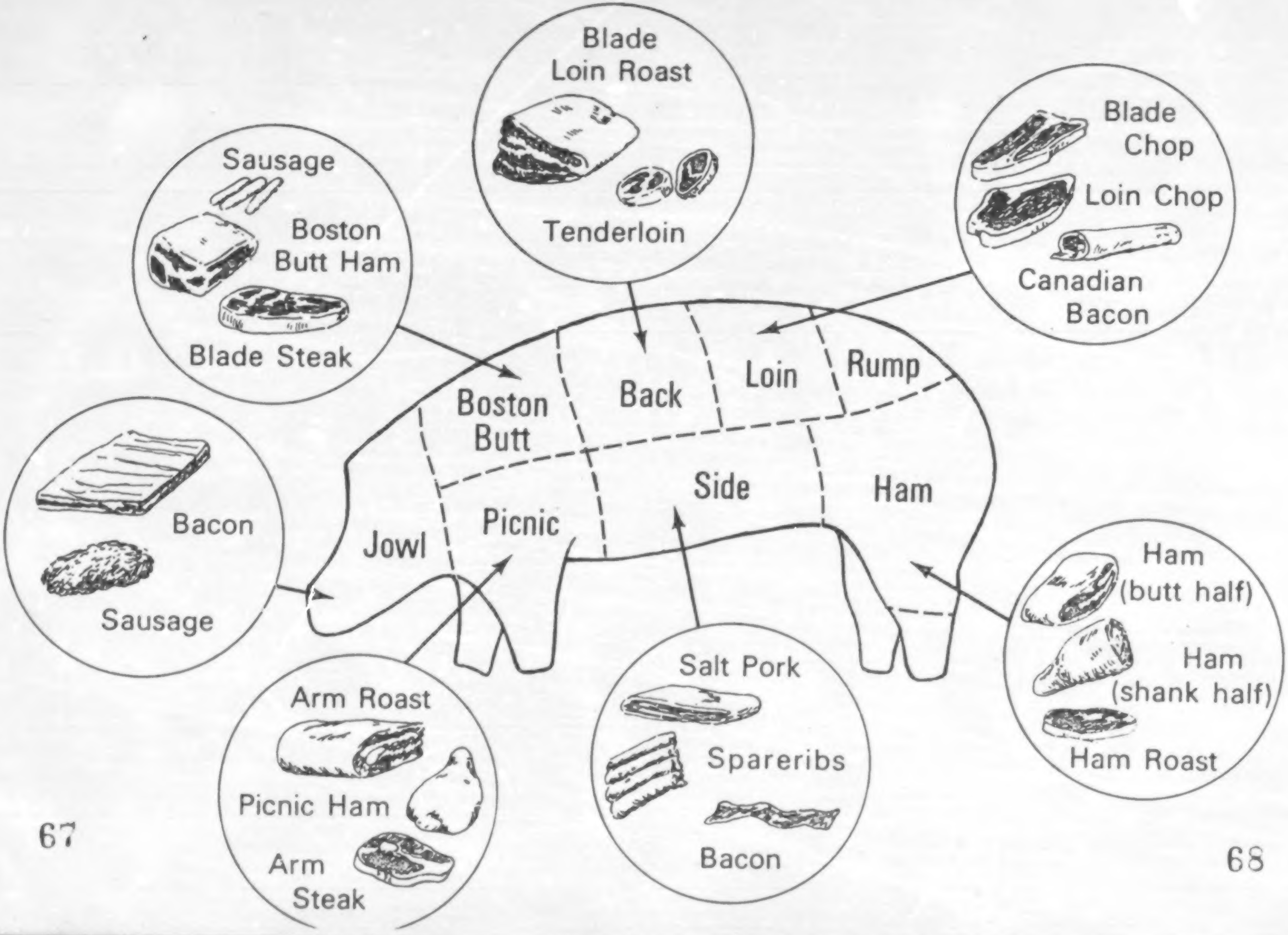


U.S. UTILITY

WHOLESALE CUTS OF PORK



LIVESTOCK TYPES

UNIT II

TEST

1. Match the terms on the left to the correct definitions:

_____1. Sow

_____2. Weaning

_____3. Boar

_____4. Gilt

_____5. Barrow

a. An intact male porcine

b. A young female swine prior to the time that she has produced her first litter.

c. A female swine that has produced a litter of pigs

d. Taking a young animal from its dam so that it can no longer suckle from the dam.

e. A male swine that was castrated prior to reaching puberty.

2. Match the swine breeds on the left to their correct characteristics:

_____1. Berkshire

_____2. Duroc

_____3. Chester White

_____4. Yorkshire

_____5. Hampshire

a. Black, with white belt around shoulders

b. Popular because of its ability to grow and perform

c. Black with six white points

d. Mother breed

e. White hog with medium lop ears

3. Identify as true or false the following statements concerning desirable characteristics of swine.

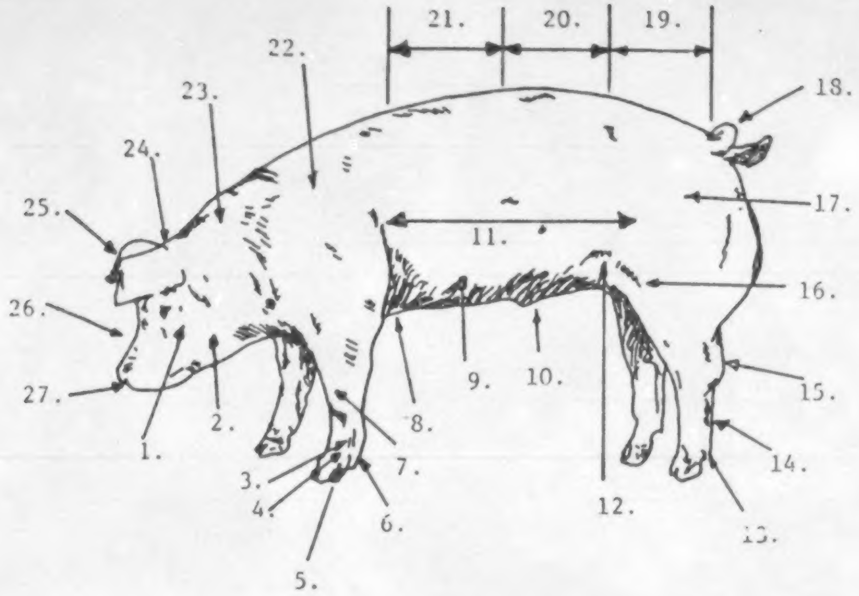
T F a. Market barrows should weigh 275 lbs

T F b. Breeding gilts should be of the same image as market hogs

T F c. Boars should not be aggressive

T F d. Meat-type hog certification standards state that minimum carcass length should be 29.5 inches.

4. Parts of a swine.



1. ______________________________

2. ______________________________

3. ______________________________

4. ______________________________

5. ______________________________

6. ______________________________

7. ______________________________

8. ______________________________

9. ______________________________

10. ______________________________

11. ______________________________

12. ______________________________

13. ______________________________

14. ______________________________

15. ______________________________

16. ______________________________

17. ______________________________

18. ______________________________

19. ______________________________

20. ______________________________

21. ______________________________

22. ______________________________

23. ______________________________

24. ______________________________

25. ______________________________

26. ______________________________

27. ______________________________

TEST

5. List five traits considered in determining swine slaughter grades.

a.

b.

c.

d.

e.

6. Identify each pork carcass selection factor as being a quantity or quality factor.

_____a. Loin eye area

_____b. Marbling

_____c. Firmness

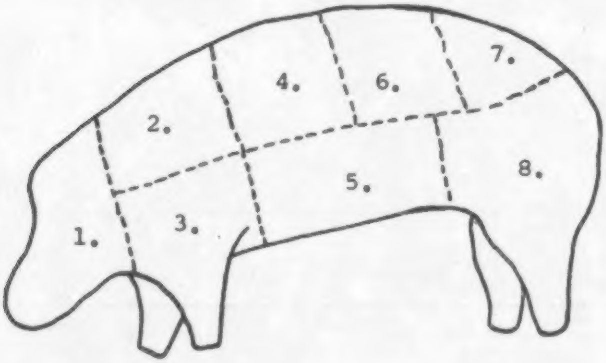
_____d. Backfat thickness

_____e. Conformation

1. Quantity

2. Quality

7. List the wholesale cuts of pork.



1. ______________

2. ______________

3. ______________

4. ______________

5. ______________

6. ______________

7. ______________

8. ______________

TEST

8. List three swine carcass traits

   a.

   b.

   c.

9. Name four swine breeds with a breed association registry.

   a.

   b.

   c.

   d.

10. List four sources of breeding stock and tell why you would or would not select them.

    a.

    b.

    c.

    d.

LIVESTOCK TYPES

UNIT II

ANSWERS TO TEST

1. a. 3 d. 2
   b. 4 e. 5
   c. 1

2. a. 5 d. 4
   b. 2 e. 3
   c. 1

3. a. F
   b. T
   c. F
   d. T

4. Those that should be listed are as shown on TM 4.

5. Any five of the following:
   a. Live weight
   b. Backfat thickness
   c. Dressing percent
   d. Carcass length
   e. Loin eye area
   f. Percent trimmed ham and loin

6. a. 1
   b. 2
   c. 2
   d. 1
   e. 1

ANSWERS TO TEST

7. Those that should be listed are as shown on TM 6.

8. a. Thickness and Firmness of belly
   b. Feathering
   c. Color of lean

9. Any four of the following:

   a. American Landrace
   b. Berkshire
   c. Chester White
   d. Duroc
   e. Hampshire
   f. Hereford
   g. Inbred breeds
   h. OIC
   i. Poland China
   j. Red Berkshire
   k. Spots
   l. Tamworth
   m. Wessex Saddleback
   n. Yorkshire

LIVESTOCK TYPES

UNIT III

TYPES OF DAIRY CATTLE

TERMINAL OBJECTIVE

Upon completion of this unit, the student will be able to differentiate between the merits of individual dairy breeds, select dairy cattle effectively and develop a useable breeding plan for a dairy herd.

SPECIFIC OBJECTIVES

After completion of this unit, students will be able to:

1. Match terms relating to dairy cattle and pedigree reading with their definitions.
2. Match dairy breeds to their unique characteristics.
3. List in descending order by population, the top five dairy breed in the U.S.
4. List the five points to consider when choosing a breed.
5. List five factors to consider when selecting dairy cattle, and label the parts of a cow
6. Define heritability and give heritability estimates for five traits in dairy cattle.
7. List three items that should be included in a breeding record, and discuss the purpose of breeding records.
8. Discuss the objectives of a breeding program.
9. List five factors that should be considered when selecting a sire.
10. Outline a useable breeding program for your dairy herd.

LIVESTOCK TYPES

UNIT III

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheet
2. Provide students with Information and Assignment Sheets andvisual aids
3. Make Transparencies
4. Discuss Objectives
5. Discuss Information and Assignment Sheets
6. Give Test

Students:

1. Read Objectives
2. Study Information Sheets
3. Participate in discussion
4. Complete Assignment Sheet and give to Instructor
5. Take Test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information Sheets
3. Supplemental Information Sheets
   - #1 - Sample Partial Pedigree
   - #2 - Diagram of Gene Transfer
   - #3 - Herd Breeding Record

INSTRUCTIONAL MATERIALS

4. Transparency Masters

   TM 1 - SAMPLE PARTIAL PEDIGREE

   TM 2 - PARTS OF A DAIRY COW

   TM 3 - HERD BREEDING RECORD

5. Assignment Sheet

   #1 - Dairy Breeding Program

6. Recommended Supplemental References

   DHI Annual Herd Summary Sheet, U.S.D.A.

   A Local AI Stud Catalogue (KABSU at Kansas State University)

References:

1. Ensminger, M.E. Dairy Cattle Science, 2nd Edition, 1980, Danville, Illinois.

2. Bath, D.L. et al, Dairy Cattle: Principles, Practices, Problems, Profits. 2nd Edition, 1978, LEA Febiger, Philadelphia.

3. Quinn, Thomas. Dairy Farm Management. 1980. Van Nostrand Reinhold Co., New York.

LIVESTOCK TYPES

UNIT III

INFORMATION SHEET

I. Terms and definitions

A. Pedigree - A record of ancestry

B. Mature Equivalent - An estimated figure which predicts the animal's production at an age of six to eight years

C. Proof - The recorded information on a sire's daughters which prove his worth.

D. Repeatability - A confident weight given to the predicted difference figure (PD)

E. Predicted Difference - The production difference between a sire's daughters and the daughters of other sires under average conditions.

F. Type - Evaluation of animal's physical appearance as an indicator of production

G. Official Records - Production records kept by a professional supervisor

H. PD - Predict Difference

I. DHIA - Dairy Herd Improvement Association

J. 305d - Production record adjusted to a standard 305 days

K. R.I.P. - Records in progress

L. RPT - Repeatibility

M. PDT - Predicted difference type

N. PDM - Predicted difference milk

O. PDS - Predicted difference dollars

P. DHIR - Dairy Herd Improvement Registry

Q. 2X - Milked twice a day

R. Progeny Test - A method of predicting a bull's breeding value by studying the production records of his daughters.

INFORMATION SHEET

II. Breeds of Dairy Cattle in the U.S.

A. Ayrshire - Scotland. Imported 1822

1. Red - Brown, with white combination
2. Horned or Polled, symmetrical udders
3. Ave. 4.0% butterfat

B. Brown Swiss - Switzerland. Imported 1869

1. Light to dark, solid brown
2. Medium length horns, nose and tongue are black
3. Ave. 4.0% Butterfat

C. Guernsey - Isle of Guernsey. Imported 1831

1. Fawn color with white markings
2. Horns incline forward, milk is yellow in color
3. Ave. 4.7% butterfat

D. Holstein-Friesian - Netherlands. Imported before 1700s

1. Black and white, or red and white only
2. Slightly larger animal, mature cows near 1500 lbs.
3. Ave. 3.7% butterfat. Fluid milk production slightly higher than other breeds
4. Most popular breed in the U.S.

E. Jersey - Island of Jersey. Imported 1850

1. Fawn, variety of color markings
2. Slightly smaller than other breeds
3. Ave. 4.9% butterfat

F. Milking Shorthorn - England

1. Red, white or any combination thereof
2. Dual purpose breed
3. Ave. 3.7% butterfat, lowest total fat of all breeds

INFORMATION SHEET

III. Top Five Dairy Breeds in the U.S.

   A. Holstein-Friesian

      1. 80% of all dairy cows in U.S. (Table 1)

      2. Top milk producer

   B. Jersey

      1. Less than 10% of U.S. dairy cow population (Table 1)

      2. Known for its high butterfat test (Table 1 & 2)

   C. Guernsey

      1. Close third to Jersey

      2. Slightly lower in BF%

   D. Brown-Swiss

   E. Ayrshire

   F. Milking Shorthorn

Table 1

Summary of Dairy Breeds in the United States

Breed	*Estimated % of total U.S. population*	*Estimated no. of living registered cows in U.S.*	*Avg. no. animals registered annually*	*Proven sires available in AI June, 1977 Pred. diff.*			*% registered animals bred AI*	*Mature cow body weight (lbs)*
				No.	*M*	*F*		
Ayrshire	<2	85–90,000	11,200 females 700 males	25	+504	+18	62	1,200
Brown Swiss	<2	80–90,000	12,400 females 2,200 males	39	+596	+22	53	1,500
Guernsey	<10	265,000	27,400 females 1,400 males	78	+466	+16	60	1,100
Holstein	80	2,000,000	263,100 females 22,500 males	908	+554	+12	73	1,500
Jersey	<10	270,000	34,400 females 2,000 males	113	+635	+23	59	1,000
Milking Shorthorn	<1	50,000	3,500 females 1,100 males	10	+743	+27	4	1,250

Source: Figures compiled from various sources, including: 4-H Dairy: Calves & Heifers, Univ. of Minnesota Agr. Ext, Service Publ. B-10, 1975; various breed associati (1974–1976); *DHI Letter*, ARS-USDA, *53*:11, 1977; and Hoard's Dairyman *122*:1022, 1977.

INFORMATION SHEET

Table 2

BREED DIFFERENCES IN MILK AND BUTTERFAT TEST AND PRODUCTION IN 1977[1]

Breed	Milk Production	Butterfat Test	Butterfat Production
	(lb)	(pct)	(lb)
Holstein	15,528	3.65	566
Brown Swiss	13,063	3.97	519
Ayrshire	11,730	3.90	457
Milking Shorthorn	10,596	3.64	386
Guernsey	10,573	4.61	487
Jersey	10,150	4.90	497

[1] Data for Table 2-3 was compiled by the Animal Improvement Programs Laboratory, Science and Education Administration, USDA, from records submitted by the 11 dairy records processing centers serving the National Cooperative Dairy Herd Improvement Program.

IV. Considerations when Choosing a Breed

A. Market considerations

1. Fat & protein content as relation to demand

2. Market for surplus cows

Table 3 Major Breed Comparison

Breed	Fat	SNF	Protein	Lactose	Milk Yield
		%			lbs.
Guernsey	4.6	9.0	3.6	4.8	10,397
Ayrshire	3.9	8.5	3.3	4.6	11,578
Brown Swiss	4.0	9.0	3.5	4.8	12,806
Holstein	3.7	8.5	3.1	4.6	12,211
Jersey	4.9	9.2	3.8	4.7	9,888

SNF -Solids - Non-fat

Milk yield - 2X, 305d, ME, DHIA averages

B. Personal preference

1. The producer must be satisfied

2. Possible past success with a breed

C. Availability of good breeding stock

1. AI service available

2. Replacement cows available

INFORMATION SHEET

- D. Suitability for meat
    - 1. Larger breeds are generally considered superior
    - 2. Nearly half of all dairy calves born are marketed for slaughter only
- E. Size of Animal
    - 1. Cow size and facilities available
        - a. Barn size
        - b. Stanchion size
    - 2. Larger breeds have a higher salvage value

V. Selecting Dairy Cattle

- A. Points to consider in selection
    - 1. Pedigree
    - 2. Progeny records
    - 3. Type classification
    - 4. Conformation
    - 5. Individual merit
- B. Information contained in a pedigree
    - 1. Record of an animal's ancestors
    - 2. Available milk production records (see sample pedigree, Information Supplement #1)
    - 3. Special awards won by animals
    - 4. Reading the pedigree (TM 1)
        - a. Must know all terminology used
        - b. Be familiar with genetic theory (Information Sheet Supplement #2)

INFORMATION SHEET

C. Progeny records

   1. Used in evaluating bulls

   2. All available records of a sire's daughters

D. Type classification

   1. What the animal looks like in relation to:

      a. General appearance

      b. Daily character

      c. Body capacity

      d. Mammary system

   2. Parts of a dairy cow (TM 2)

   3. Fifteen major cow parts to consider during selection

      a. Fore udder and attachment

      b. Rear udder

      c. Stifle

      d. Back

      e. Ribs

      f. Barrel

      g. Heart Girth

      h. Neck

      i. Jaw

      j. Throat

      k. Chest floor

      l. Mammary veins

      m. Teats

E. Conformation

   1. Shape and proportion of animal

   2. Legs wide and well supporting

   3. Teat size and placement

   4. Length

   5. Body capacity

F. Individual cow goals

   1. High milk & BF yield

   2. Longevity

INFORMATION SHEET

VI. Heritability

A. Defined

1. An estimate of the portion of phenotypic variation in a population that is due to heredity

2. Measure of additive genetic variation

B. Variation in livestock is a result of a two factor interaction

1. Environment

2. Inheritance

C. Heritability estimates of economic traits (see Table 4 below)

Table 4

Trait	Heritability
Production traits:	
Milk production	25
Percent fat	50
Percent protein	50
Percent SNF	50
Feedlot gain	45
Physical traits:	
Stature	40
Udder support	20
Legs and feet	15
Management traits:	
Milking speed	25
Birth weight	40
Temperament	40
Fertility	05

VII. Breeding Records

A. Information to be included in breeding records

1. Positive identification of the animal

2. Sire's name and identification

INFORMATION SHEET

3. Important dates affecting breeding
    a. Heat
    b. Calving
    c. Service
    d. Dry-off
    e. Pregnancy check
    f. Freshened

B. Purpose of breeding records
    1. Draw attention to infertile bulls
    2. Establish breeding dates
    3. Determine feeding program
    4. Establish calving dates
    5. Provide an overall picture of your breeding program

C. Characteristics of good breeding records
    1. Located where they are used and accessable at all times
    2. Are kept up-to-date
    3. Easy to use
    4. Include all essential information

D. Sample breeding records
    1. Information sheet supplement #3
    2. TM 3

VIII. The Breeding Program

A. Objectives of a breeding program
    1. To produce cows with the greatest possible genetic capacity to make a profit
    2. To produce a steady supply of genetically superior heifers

INFORMATION SHEET

B. Steps to follow in planning a program

1. Choose a suitable breed
2. Select the best cows available
3. Decide on a breeding system - inbreeding vs. outcrossing vs. crossbreeding
4. Evaluate the strong and weak points of your herd
5. Obtain the services of the sire(s)
6. Enroll in a testing program - (DHIA, DHIR)
7. Keep your production goals in mind
8. Choose a method of selection - individual, tandem, selection index
9. Maintain standards of milking and herd management
10. Follow a feeding and management program that will not restrict top producing animals to fully express their genotype

IX. Selecting a Dairy Sire

A. AI or natural mating

1. AI allows the mating of specific bulls to specific cows
2. Usually more superior bulls can be used more economically with AI
3. Purchasing proven sires is very expensive, but may pay for very large breeders
4. More information is usually available on AI sires, (more daughters).

B. Points to consider when selecting sires for AI

1. Progeny records
2. Select sires in such a way to avoid inbreeding
3. Select sires that produce small calves for heifers
4. Consider the cost of semen of each bull

INFORMATION SHEET

5. Select bulls with high PDs, PDT, PDM, and PD$

6. Choose bulls that are of better quality than the cows

7. Select individual bulls which possess the capacity to strengthen weaknesses in specific cows

C. Steps to follow in selection of AI sire

    1. Observe the physical characteristics of the cow

    2. Make a list of some of the bulls that are strong in the cow's weaknesses

    3. Evaluate the sires for production records

    4. Plan first and second choices of the bull to be used

D. Considerations when selecting herd sires

    1. Progeny records

    2. Pedigree records

    3. Type information (may be included in pedigree)

    4. Health records

    5. Cost

    6. Method of purchase

        a. Purchased bull calves

        b. Special AI mating with a superior cow

E. Ways of judging a sire's value for milk production, a sex-limited trait

    1. Progeny testing (most accurate)

    2. Looking at co-lateral relatives

    3. Looking at siblings

    4. Studying ancestors

    5. Type score

LIVESTOCK TYPES

UNIT III

SUPPLEMENTAL INFORMATION SHEET #1: Sample Partial Pedigree

Holstein Sire VG (86) PQ 1/77

4000 d., 5071 R., 1479 H., 16878 M., 3.53%, 595 BF.

Herdmates avg. 15541 M., 3.60% 559 BF.

Diff. + 1337 M., - .07% + 36 BF.

RPT 99%

EDS or PD + $90 + 1416 M., - .07% + 39 BF.

HFA 1/74	Act.	Age Adj.
252 d. avg.	75.1	76.8
192 d. avg.	75.2	76.9
192 dams avg.	79.8	79.5

RPT 92%

PDT - .38

HFA Data 1/74 252 Dtr/Breedmate

ST	HD	FE	BK	RP	HL	FT	FU	RU	US	TT	MC
3	5	4	3	5	3/4	4	3/5	4/5	3/4	2/3	5

Holstein Calf

Holstein Dam G (78)

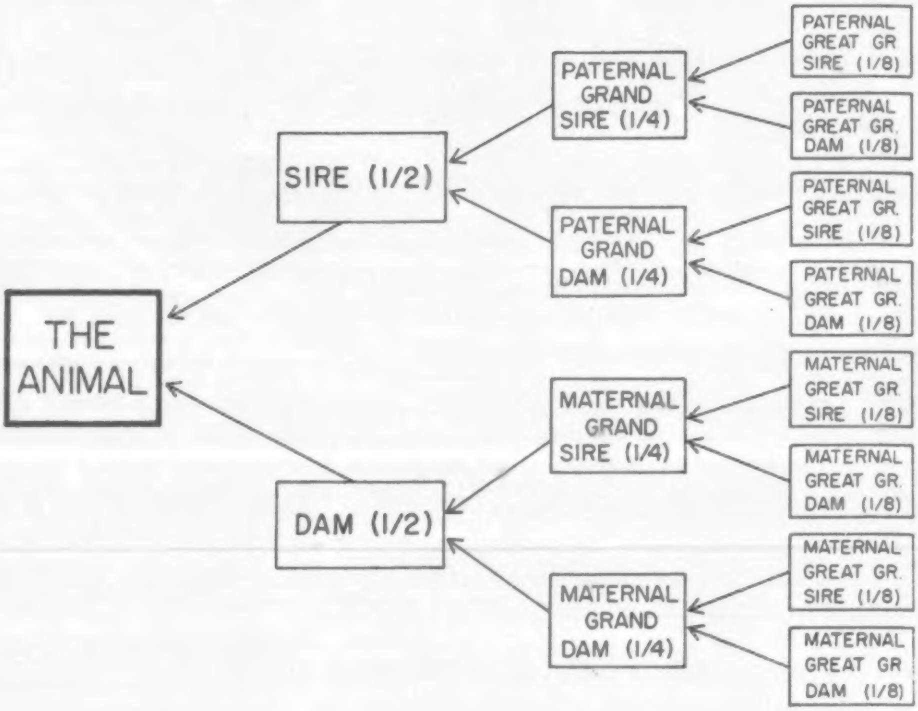
2y 5m	363d	2x	15389m	3.77%	558 BF
3y 6m	354d	2x	18809m	3.73%	702 BF
4y 7m	362d	2x	20157m	3.70%	746 BF
5y 9m	365d	2x	18761m	3.58%	672 BF
7y 2m	346d	2x	19100m	3.69%	705 BF
8y 4m	114d*	2x	5020m	3.75%	188 BF
Lifetime			100842m		3705 BF

*died

LIVESTOCK TYPES

UNIT III

SUPPLEMENTAL INFORMATION SHEET #2: Diagram of Gene Transfer


THE ANIMAL
SIRE (1/2)
DAM (1/2)
PATERNAL GRAND SIRE (1/4)
PATERNAL GRAND DAM (1/4)
MATERNAL GRAND SIRE (1/4)
MATERNAL GRAND DAM (1/4)
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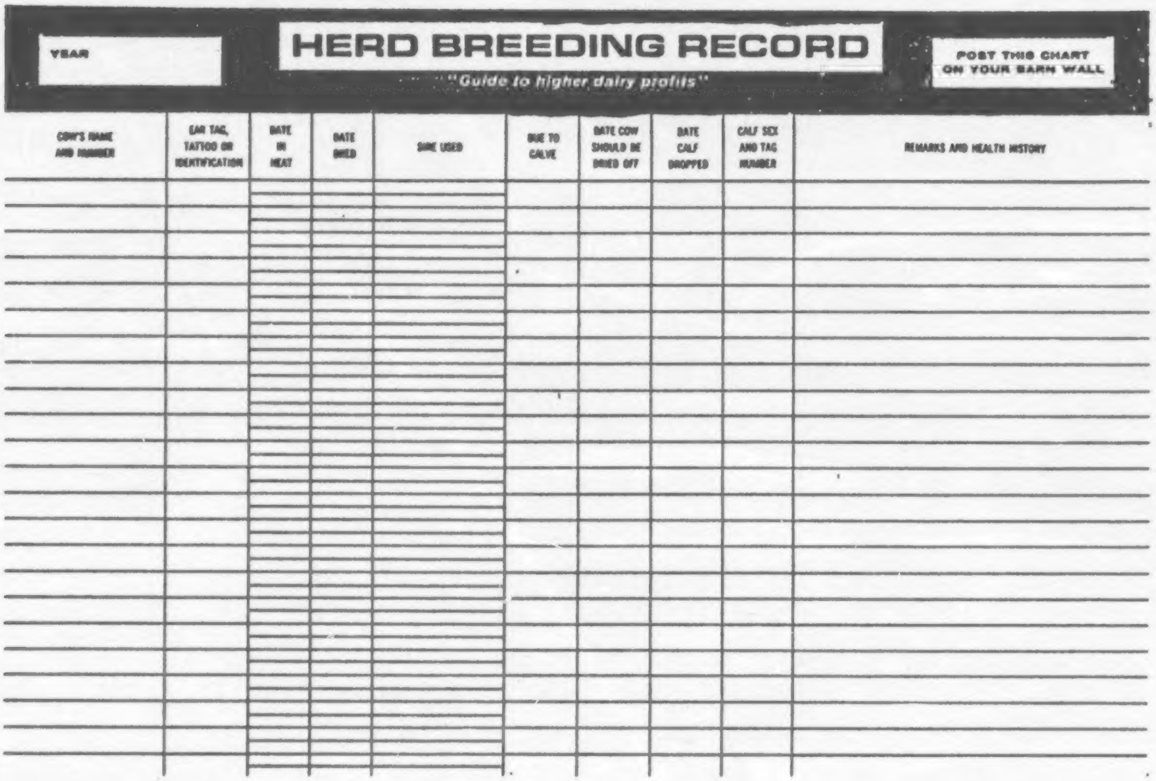
LIVESTOCK TYPES

UNIT III

SUPPLEMENTAL INFORMATION SHEET #3: Herd Breeding Record



YEAR

HERD BREEDING RECORD

"Guide to higher dairy profits"

POST THIS CHART ON YOUR BARN WALL

COW'S NAME AND NUMBER	EAR TAG, TATTOO OR IDENTIFICATION	DATE IN HEAT	DATE BRED	SIRE USED	DUE TO CALVE	DATE COW SHOULD BE DRIED OFF	DATE CALF DROPPED	CALF SEX AND TAG NUMBER	REMARKS AND HEALTH HISTORY

The barn breeding chart is one of the simplest and most commonly used breeding records. (E.R. Squibb and Sons, Inc., Animal Health and Bulk Marketing Division)

SAMPLE PARTIAL [illegible]

Holstein Sire VG (86) PQ 1/77

4000 d., 5071 R., 1479 H., 16878 M., 3.53%, 595 BF.

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Diff. + 1337 M., - .07% + 36 BF.

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HFA Data 1/74 252 Dtr/Breedmate

ST	HD	FE	BK	RP	HL	FT	FU	RU	US	TT	MC
3	5	4	3	5	3/4	4	3/5	4/5	3/4	2/3	5

Holstein Calf

Holstein Dam G (78)

2y 5m	363d	2x	15389m	3.77%	558 BF
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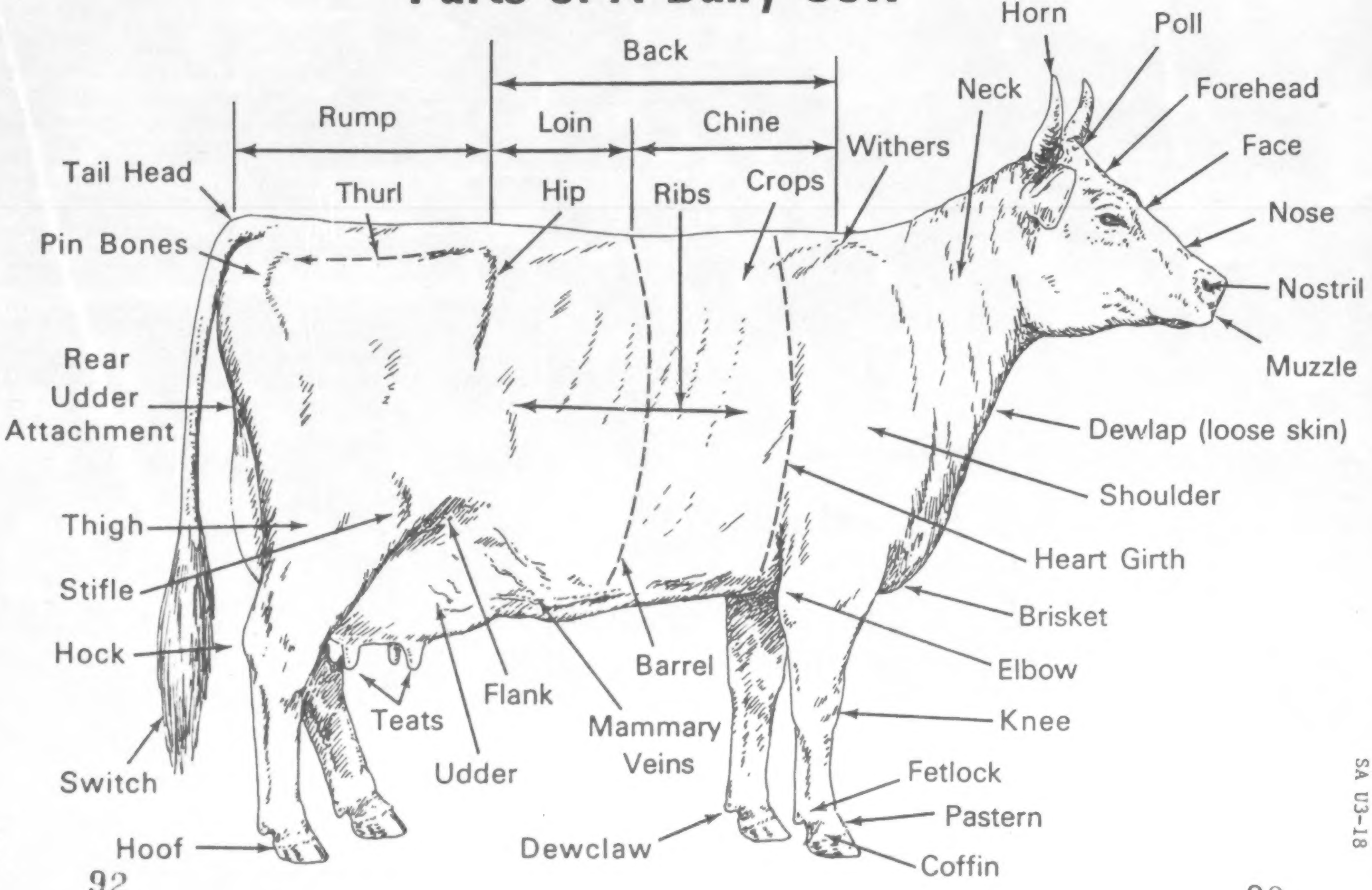
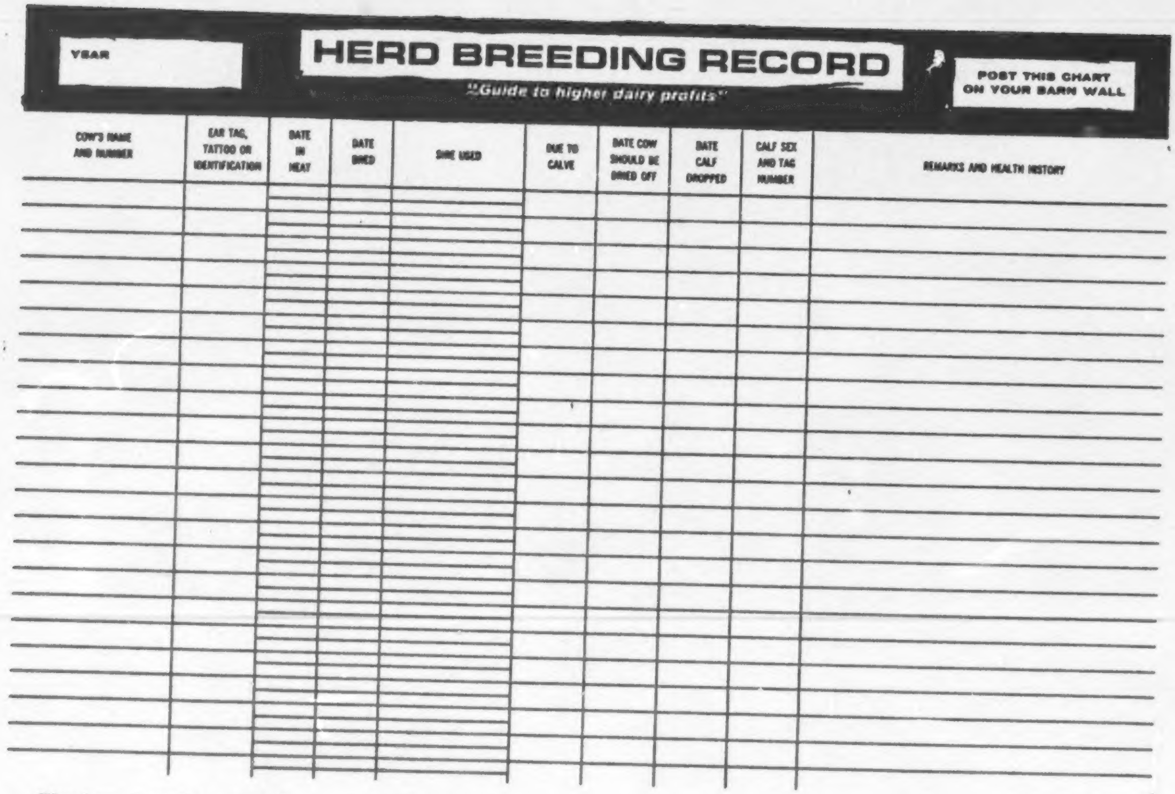
Lifetime			100842m		3705 BF

*died

Parts of A Dairy Cow





YEAR

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COW'S NAME AND NUMBER	EAR TAG, TATTOO OR IDENTIFICATION	DATE IN HEAT	DATE BRED	SIRE USED	DUE TO CALVE	DATE COW SHOULD BE DRIED OFF	DATE CALF DROPPED	CALF SEX AND TAG NUMBER	REMARKS AND HEALTH HISTORY

The barn breeding chart is one of the simplest and most commonly used breeding records. (E.R. Squibb and Sons, Inc., Animal Health and Bulk Marketing Division)

LIVESTOCK TYPES

UNIT III

ASSIGNMENT SHEET #1: Dairy Breeding Program

Utilizing all available information, develop and outline a breeding program for a 60 cow dairy herd. Select sires according to individual merit and compatability with the herd. The herd is of average production. Justify all decisions.

LIVESTOCK TYPES

UNIT III

TEST

1. Match the terms on the left to the correct definition.

_____a. PD

_____b. DHIA

_____c. Proof

_____d. Mature Equivalent

_____e. Type

_____f. Predicted difference

_____g. RPT

_____h. Repeatability

_____i. Progeny test

_____j. Pedigree

1. Abbreviation for repeatability
2. A confidence value given to PD
3. Abbreviation for predicted difference
4. Using offspring to detect breeding value
5. A record of ancestry
6. Abbreviation for Dairy Herd Improvement Association.
7. A figure to adjust an individual's production record to that of a standard age animal
8. Physical appearance
9. The recorded information of a sire's daughters that prove his worth
10. The variation between a sire's daughters and the daughters of other sires under average conditions

2. Match the following dairy breed to their unique characteristics

_____a. Brown Swiss

_____b. Ayrshire

_____c. Holstein

_____d. Milking shorthorn

_____e. Jersey

_____f. Guernsey

1. Known for the highest Ave. BF test.
2. Known for the highest fluid milk production.
3. Of Scottish origin.
4. Has milk that is very yellow.
5. Solid brown in color with black nose
6. Dual purpose breed.

TEST

3. List in descending order of population, the top five dairy breeds in the U.S.

   a.

   b.

   c.

   d.

   e.

4. List the five points to consider when choosing a breed.

   a.

   b.

   c.

   d.

   e.

5. a. List five factors to consider when selecting dairy cattle.

      1.

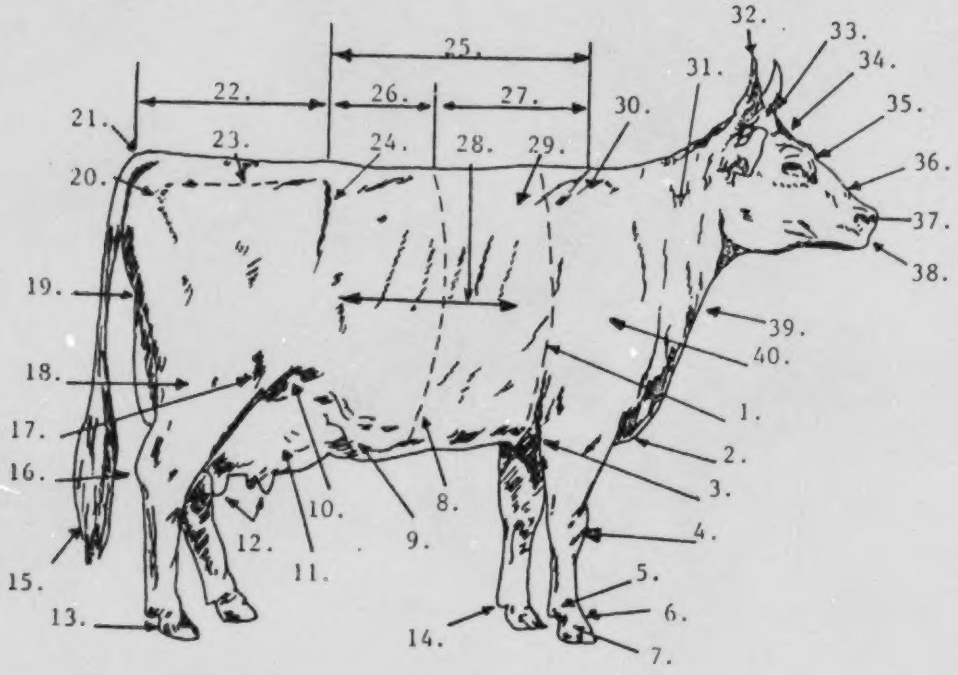
      2.

      3.

      4.

      5.

5. b. Label the parts of the cow.



1. ____________________
2. ____________________
3. ____________________
4. ____________________
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34. ____________________
35. ____________________
36. ____________________
37. ____________________
38. ____________________
39. ____________________
40. ____________________

TEST

6. a. Define heritability

   b. Give the heritability estimates of five traits in dairy cattle.

      1.

      2.

      3.

      4.

      5.

7. a. List five items that should be included in a breeding record.

      1.

      2.

      3.

      4.

      5.

   b. Discuss the purpose of breeding records.

TEST

8. Discuss the objectives of a breeding program.

9. List five factors that should be considered when selecting a sire.

   a.

   b.

   c.

   d.

   e.

10. Outline a useable breeding program for your dairy herd. (Assignment Sheet #1).

LIVESTOCK TYPES

UNIT III

ANSWERS TO TEST

1. a. 3
   b. 6
   c. 9
   d. 7
   e. 8
   f. 10
   g. 1
   h. 2
   i. 4
   j. 5

2. a. 5
   b. 3
   c. 2
   d. 6
   e. 1
   f. 4

3. a. Holstein
   b. Jersey
   c. Guernsey
   d. Brown Swiss
   e. Ayrshire

4. a. Market trends
   b. Personal preference
   c. Availability of good breeding stock
   d. Suitability for meat
   e.

5. a. 1. Pedigree
      2. Progeny records
      3. Type classification
      4. Conformation
      5. Individual merit
   b. Those that should be listed are as shown on TM 2.

ANSWERS TO TEST

6. a. An estimate of the portion of phenotypic variation in a population that is due to heredity.

   b. Any five:

      1. Milk production
      2. Percent fat
      3. Percent protein
      4. Percent SNF
      5. Percent gain
      6. Stature
      7. Udder support
      8. legs and feet

7. a. 1. Positive I.D. of the animal
      2. The sire's name and I.D.
      3. All important dates affecting breeding.
      4.
      5.

   b. Discussed to the satisfaction of the Instructor.

8. Discussed to the satisfaction of the Instructor.

9. a. Progeny records
   b. Pedigree
   c. Cost
   d. Type
   e. Compatability with your herd

10. Complete Assignment Sheet #1 to the satisfaction of the Instructor.

LIVESTOCK TYPES

UNIT IV

TYPES OF SHEEP

TERMINAL OBJECTIVE

Upon completion of this unit, the student should be able to identify breeds, characteristics and economic traits. This objective will be considered achieved by scoring 85 percent or more on the final test.

SPECIFIC OBJECTIVES

Upon completion of this unit, the student will be able to:

1. Match terms associated with sheep to the correct definition.
2. Match sheep breeds to their correct characteristics.
3. Explain four considerations when selecting initial breeding stock.
4. List the four major traits to consider when selecting replacement ewes.
5. List four performance traits of lambs.
6. List and explain three of four benefits of good breeding records.
7. Explain five wool grading terms.
8. Give the approximate age of a sheep by studying its teeth.
9. List four considerations when selecting feeder lambs.
10. Know the location of the 25 body parts of the sheep.
11. Identify the five wholesale cuts of lamb.

LIVESTOCK TYPES

UNIT IV

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheet
2. Provide students with Information Sheets
3. Make transparencies
4. Discuss Terminal and Specific Objectives
5. Introduce and discuss Information Sheets
6. Provide pictures of the sheep breeds
7. Give Test

Students:

1. Read Objective Sheet
2. Study Information Sheets
3. Participate in discussion
4. Take Test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objective Sheet
2. Information Sheets
3. Transparency Masters

   TM 1 - CLASSING SHEEP BY TYPE

   TM 2 - MUTTON AND WOOL TYPES

   TM 3 - U.S. GRADES OF WOOL

   TM 4 - DETERMINING THE AGE OF SHEEP BY THEIR TEETH

INSTRUCTIONAL MATERIALS

TM 5 - PARTS OF A SHEEP

TM 6 - BUTCHER LAMB CHART

4. Test

5. Answers to Test

References:

1. Cooper, M. McG. Profitable Sheep Farming, 1971, Ipswich Farming Press, England.

2. Ensminger, M.E. Sheep and Wool Science, 4th Edition, 1970. Interstate Publishers, Danville, Illinois.

3. Harmsworth & Page - Sharp, J. Sheep and Wool Classing, F.W. Cheshire Publishing Pty. Ltd. Australia, 1970.

4. Juergenson, Elwood M., Approved Practices in Sheep Production, 1973, 3rd Edition, Interstate Publishers, Danville, Illinois.

LIVESTOCK TYPES

UNIT IV

INFORMATION SHEET

I. Terms and Definitions

A. Clip - The quantity of wool shorn in a single season from a particular area or flock

B. Crimp - Natural waviness of the wool fiber

C. Crossbred wool - All wool from other than the Merino breed; wool from a long wool x shortwool sheep

D. Dual purpose sheep - Sheep suitable to both wool and meat production

E. Ewe - Female sheep of breeding age

F. Flock (or band) - a group of sheep

G. Frosty face - Chalky, harsh, white hair on the face of some sheep

H. Full Mouth - A sheep over four years old, all eight front incisors showing

I. Lamb - Young sheep, under 12 months of age

J. Ram (or buck) - A male sheep used for breeding

K. Feeder lambs - lambs that show indications of making good gains if placed on feed

L. Wether - Male sheep castrated before maturity

M. Open face - Sheep with little or no wool on the face, especially around the eyes

N. Wool Blind - Having wool that has grown over the eyes, obstructing the sheep's vision

O. Woolen - Fabrics or yarns made of uncombed wool

P. Worsted - Fabrics or yarns made of combed wool

INFORMATION SHEET

II. Sheep Breeds

  A. Cheviots

    1. White, open face and legs

    2. Very hardy

    3. Easy lambing and excellent mothers

    4. Light fleeced

  B. Columbia

    1. Open faced and polled

    2. Wool clip of 11-13 pounds

    3. Mature weight 250 lbs. Ram, 125-190 lbs. Ewe

    4. Animals must be inspected for registration

  C. Corriedale

    1. Medium sized, polled

    2. Relatively open faced, white color markings

    3. Clip weight, 10-12 lbs

    4. Dual-purpose breed

  D. Dorset

    1. Light fleeced and horned

    2. Will breed during off-season (not houselambs)

    3. White markings

    4. Prolific - twins and triplets common

  E. Hampshire (TM 2)

    1. Open faced and polled

    2. Medium wool clip 6-12 lbs.

    3. Large mutton-type, mature rams weigh 225-300 lbs.

    4. Black face, legs and ears

INFORMATION SHEET

F. Finnish Landrace

1. Wooless head (no wool on head)
2. Small in size and very gentle
3. Light fleece (5.5 lb.)
4. Very prolific,triplets most common

G. Delaine Merino

1. C type wool - smooth skin
2. Ewes are polled - rams are horned
3. One of the oldest, most respected breeds

H. Oxford

1. Large sheep
2. Heavy wool producer of medium grade
3. Dark markings

I. Lincoln

1. Largest long wool breed
2. Staple length of 10-14 ins.
3. Clip 15-20 lb.
4. Rams weigh 250-350 lbs. Ewes 225-250 lbs.
5. May be the heaviest breed known

J. Rambouillet (TM 2)

1. Popular range sheep
2. Cross well with Suffolk and Hampshire
3. Heavy wool producer
4. Rams are horned, white markings

INFORMATION SHEET

K. South down
    1. Medium to small size
    2. Fleece 5-8 lbs, excellent quality
    3. Excellent for crossbreeding

L. Shropshire
    1. 'Middle-of-the-road'type
    2. Prone to wool-blindness
    3. Good fertility, 125-175% lambing
    4. Good mutton type

M. Suffolk
    1. Poor wool producers
    2. Large, fast growing lambs
    3. Open faced - black markings

N. Targhee
    1. Originated in Idaho 1926
    2. Clip - 11 pounds, 3 ins. staple
    3. Is a Lincoln-Rambouillet-Corriedale cross

III. Selecting Initial Breeding Stock

A. Adaptability
    1. Climate - heavy wool in cold climates
    2. Grazing conditions - small sheep are better foragers
    3. Match the local market
        a. Wool
        b. Mutton or lamb

INFORMATION SHEET

B. Proper breed and type (TM 1 and 2)
  1. Adaptability (section A)
  2. Desirable type
    a. Finewool type
    b. Mutton type
    c. Fur type - Karateal
  3. Select a common breed
    a. Common to your community
    b. Reputable local breeders

C. Decide on total herd size
  1. Grazing available
  2. Experience
  3. Labor available

D. Establish desirable trait goals
  1. Open face
  2. Wool - mutton, or both
  3. Size of lambs at marketing

IV. Traits of Selecting Replacement Ewes
  A. Mothering ability
    1. Number of lambs weaned
    2. Weight of lambs weaned
    3. Adaptability (environmental)
    4. Lambing ease
    5. Milking ability - 6 week lamb weights

INFORMATION SHEET

- B. Wool characteristics
    - 1. Clip weight
    - 2. Grade - uniform to rest of flock
- C. Carcass
    - 1. Conformation - uniformity in the flock
    - 2. Rate of gain
    - 3. Muscle development
- D. Uniformity with the flock
    - 1. Will the wool class together?
    - 2. Same breed characteristics

V. Performance Traits of Lambs

- A. Wool growth
- B. Carcass quality
    - 1. Conformation
    - 2. Finish
    - 3. Marbling
    - 4. Percent yield
- C. Economic traits (feed lot traits)
    - 1. Rate of gain
    - 2. Feed efficiency
- D. General growth (Market weight)
    - 1. Dress weight
    - 2. Weight of finish

VI. Benefits of Breeding Records

- A. Better selection of replacement ewes
    - 1. Will indicate genetically superior dams

INFORMATION SHEET

2. Will measure economic traits

B. Indicate breeding efficiency

1. Detect non-breeders
2. Indicate most fertile animals
3. Has the potential of increasing lambing percentage

C. Guides the removal of undesirable traits

1. Can trace carriers of undesirable genes
2. Can know immediately if a ram carries an undesirable gene

D. Can trace ancestrial lines

1. Essential to the purebred breeder
2. Desirable if your herd is based on an outstanding individual

VII. Wool Grading Terms (TM 3)

A. Spinning count

1. Hanks of wool, each 256 yards long (560 yd. for worsted) that can be spun from 1 pound of processed wool
2. Indicates fineness of the fiber

B. Character

1. Crimp
2. Handling qualities
3. General appearance of the wool

C. Staple length

1. Actual length of the wool
2. Measured stretched out

D. Purity

1. Absence of fibers other than wool

INFORMATION SHEET

    2. Including non-wool hair growth

  E. Soundness

    1. Strength to undergo combing

    2. Length

    3. Exibiting considerable elasticity

  F. Yield

    1. Amount of scoured wool obtained from a unit of grease wool

    2. Expressed as follows:

      a. $\frac{\text{scoured wool}}{\text{grease wool}} = \text{Yield}$

      b. $\frac{7}{10} = 70\%$ yield

VIII. Aging Sheep By Their Teeth (TM 4)

  A. Lambs mouth

    1. Eight incisors

    2. Temporary or milk teeth

  B. Yearling

    1. One pair of permanent incisors

    2. Six milk teeth

  C. 2-yr old.

    1. Two pairs of permanent teeth

    2. Two pairs of milk teeth

  D. 3-yr. old - 3 pairs permanent teeth

  E. 4-yr. old - all four pairs permanent teeth

  F. Broken mouth

    1. Some teeth broken off

    2. Sheep of lower value

INFORMATION SHEET

G. Smooth mouth

   1. Teeth broken or worn excessively

   2. Sheep of little value regardless of age

IX. Selecting Feeder Lambs

   A. Buy at correct age

      1. Six months is best 50-60 lbs.

      2. Young lambs may shrink excessively

   B. Feed quality lambs

      1. Deep, rugged

      2. Thick-bodied

   C. Consider the fleece

      1. Lambs may have from four to six lbs. of wool

      2. Shorn lambs are of less value

   D. Learn their origin

      1. Past feeding history

      2. Possible parasites

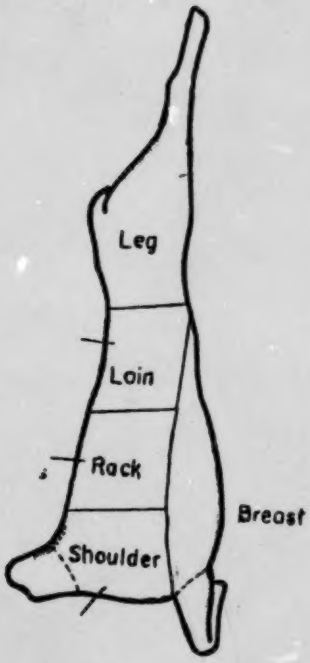
      3. Clue to their true age

X. Body Parts of the Market Lamb (TM 5)

INFORMATION SHEET

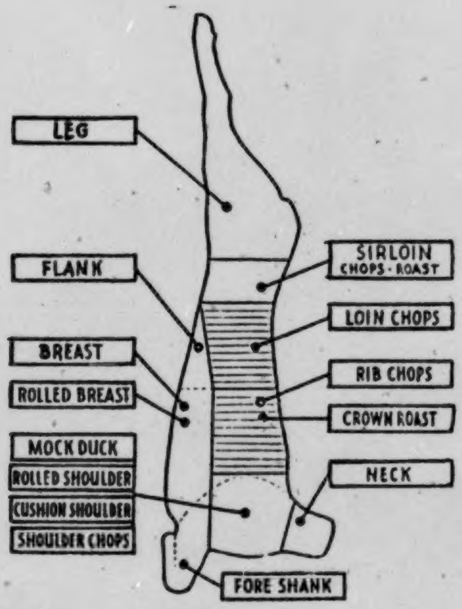
XI. Cuts of Lamb (TM 6)

1. Leg
2. Loin
3. Rack
4. Shoulder
5. Breast



Lamb

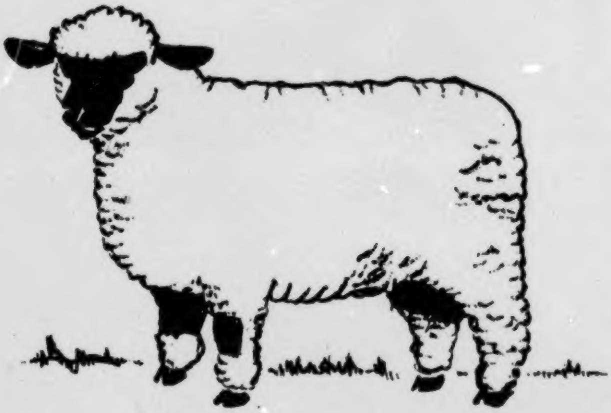
B. Retail cuts



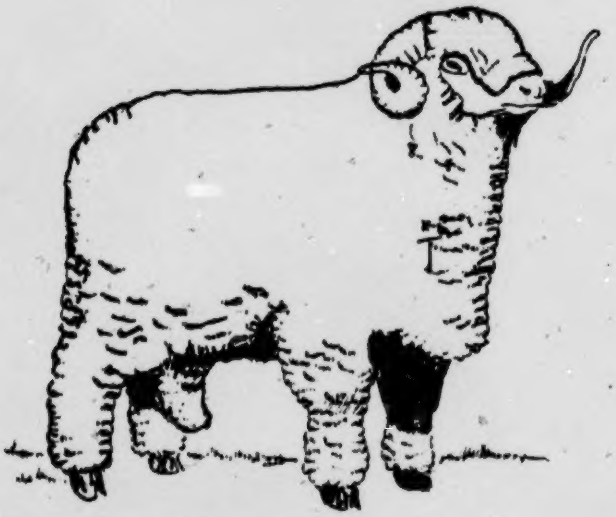
CLASSING SHEEP BY TYPE

Fine Wool Type	Fine Wool Breeds	Rambouillet
		Delaine-Merino
		American-Merino
Mutton Type	Long Wool Breeds	Lincoln
		Leicester
		Cotswold
		Romney Marsh
		Black-faced Highland
	Medium Wool Breeds	Southdown
		Shropshire
		Hampshire
		Suffolk
		Oxford-Down
		Tunis
		Cheviot
		Dorset
		Targhee
		Romeldale
		Panama
		Corriedale
		Columbia
Fur Type		Karakul

MUTTON AND WOOL TYPES



Hampshire ewe----mutton type



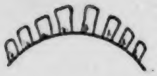
Rambouillet ram----fleece type

U.S. GRADES OF WOOL

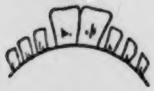
Spinning-count System	Corresponding Older American System	Spinning-count System	Corresponding Older American System
80's 70's 64's	Fine	46's	Low ¼-blood
62's* 60's 58's	½-blood	44's	Common
56's	3/8-blood	40's 30's	Braid
50's 48's	¼-blood		

*A grade widely used in trade, but not yet recognized officially.

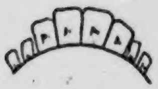
DETERMINING THE AGE SHEEP BY THEIR TEETH



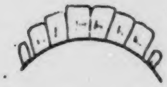
1. Lamb's mouth with 8 incisors, these temporary teeth are called milk teeth.



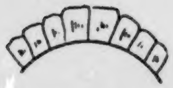
2. Yearling mouth with 1 pair of permanent incisors



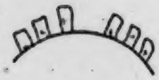
3. 2-yr. old mouth with 2 pair of permanent incisors



4. 3-yr. old mouth with 3 pairs of permanent incisors

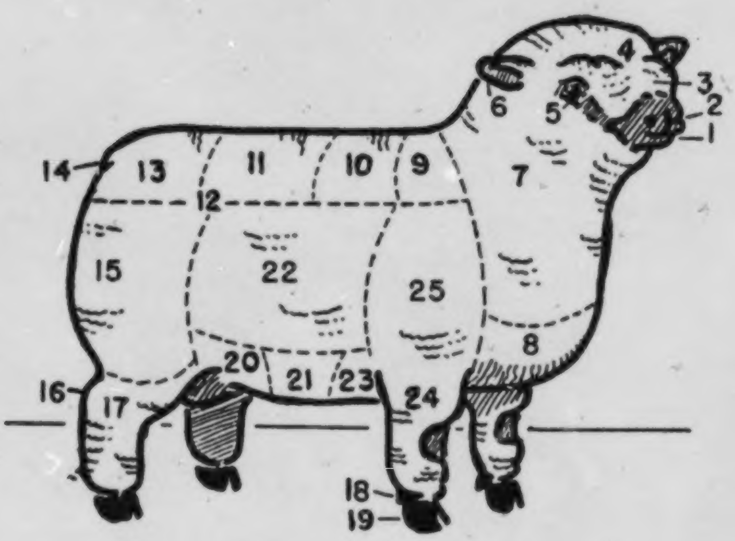


5. 4-yr. old mouth with 4 pairs of permanent incisors



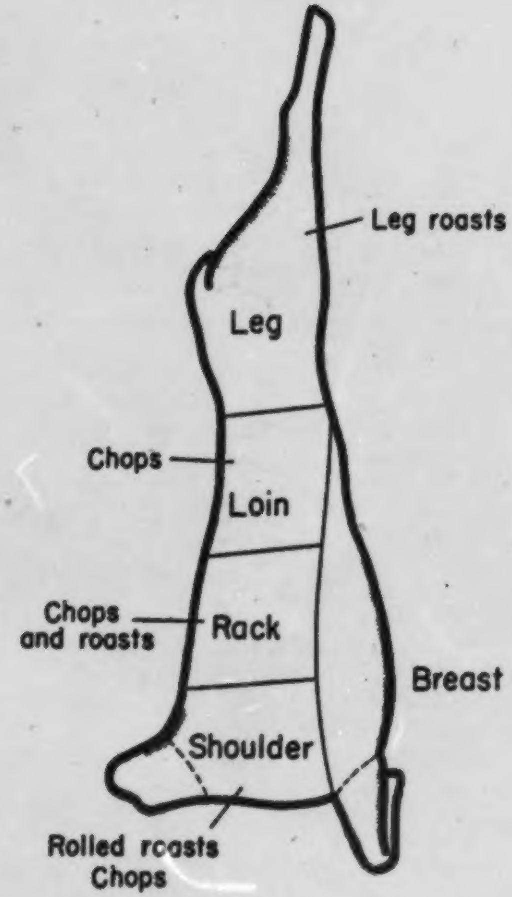
6. Broken mouth condition which may begin to occur about 6 yrs. of age, a sheep that has lost all incisors is called a gummer

PARTS OF A SHEEP



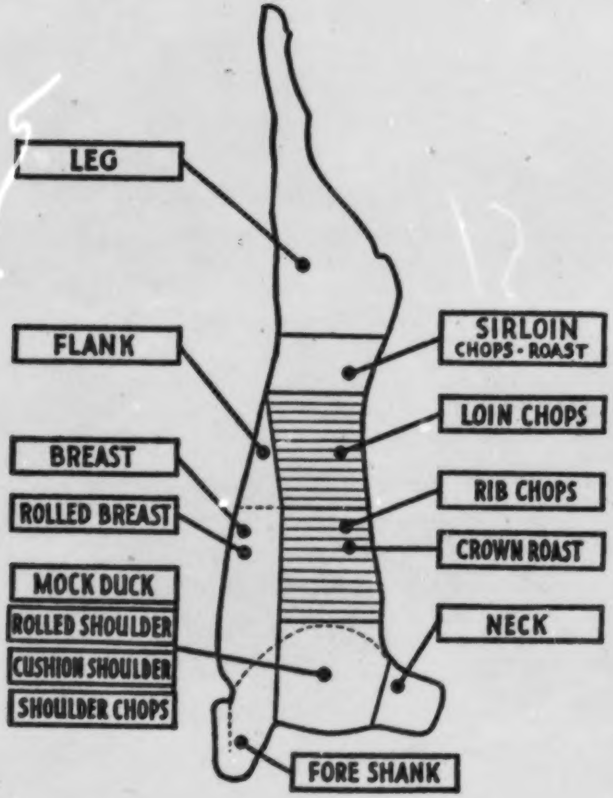
1. Mouth
2. Nostril
3. Face
4. Forehead
5. Eye
6. Ear
7. Neck
8. Breast
9. Top of shoulder
10. Back
11. Loin
12. Hip
13. Rump
14. Dock
15. Thigh
16. Hock
17. Hind leg
18. Dewclaw
19. Fout
20. Hind flank
21. Belly
22. Ribs
23. Fore flank
24. Fore leg
25. Shoulder

BUTCHER LAMB CHART



Lamb

WHOLESALE CUTS



RETAIL CUTS

LIVESTOCK TYPES

UNIT IV

TEST

1. Match the following terms on the left with their correct definitions.

_____a. Crimp

_____b. Full mouth

_____c. Dual purpose sheep

_____d. Flock

_____e. Open face

_____f. Wool blind

_____g. Worsted

_____h. Woolen

_____i. Frosty-face

_____j. Clip

1. Made from uncombed wool
2. Wool grown over the eyes
3. White hair covering the face
4. One seasons cutting of wool
5. Suitable for both meat and wool production.
6. No wool on the face
7. The natural waviness of wool fiber
8. A mature sheep
9. A group of sheep
10. Made from combed wool

2. Match the following breeds of sheep to their unique characteristics.

_____a. Hampshire

_____b. Cheviot

_____c. Columbia

_____d. Dorset

_____e. Finnish Landrace

_____f. Merino

_____g. Lincoln

_____h. Targhee

_____i. Suffolk

_____j. Rambouillet

1. Will breed during off season
2. Largest long wool breed
3. Oldest most respected breed
4. Large mutton type
5. Wool type, wrinkly skin
6. White open face and legs, hardy
7. Must be inspected for registration
8. Very prolific, lightfleecing gentle
9. Crossbreed, developed in Idaho
10. Popular breed in U.S. mutton type

TEST

3. Explain these four considerations for selecting your first breeding stock.

   a. Breed

   b. Adaptability

   c. Herd size

   d. Trait goals

4. List the four major traits to consider when selecting replacement ewes.

   a.

   b.

   c.

   d.

5. List four performance traits of lambs.

   a.

   b.

   c.

   d.

6. List and explain three benefits of good breeding records.

   a.

   b.

   c.

TEST

7. Explain these five wool-grading terms.

   a. Staple length

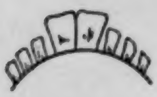
   b. Character

   c. Purity

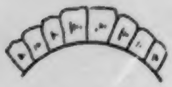
   d. Spinning count

   e. Soundness

8. Give the approximate age of the two sets of sheep teeth.

A. 

Age ________

B. 

Age __________

9, List four things to look for when selecting feeder lambs.

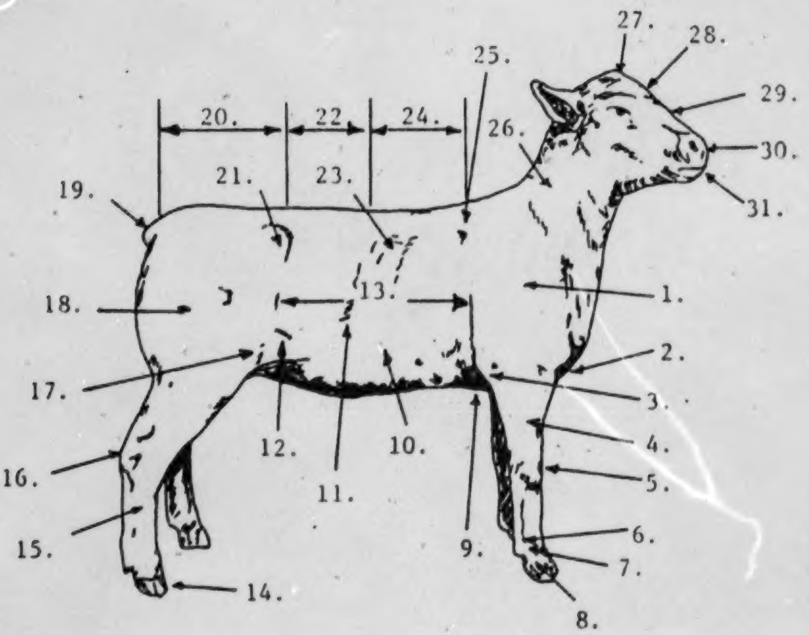
   a.

   b.

   c.

   d.

10. Sheep



1. ____________________
2. ____________________
3. ____________________
4. ____________________
5. ____________________
6. ____________________
7. ____________________
8. ____________________
9. ____________________
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11. ____________________
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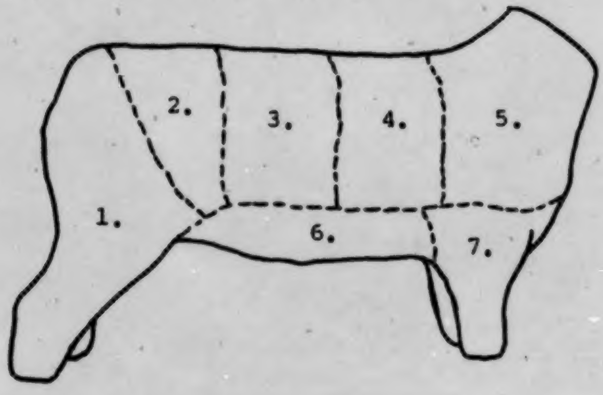
20. ____________________
21. ____________________
22. ____________________
23. ____________________
24. ____________________
25. ____________________
26. ____________________
27. ____________________
28. ____________________
29. ____________________
30. ____________________
31. ____________________

TEST

11. Identify the five wholesale cuts of lamb on the drawing below:



1. ____________________
2. ____________________
3. ____________________
4. ____________________
5. ____________________
6. ____________________
7. ____________________

LIVESTOCK TYPES

UNIT IV

ANSWERS TO TEST

1. a. 7
   b. 8
   c. 5
   d. 9
   e. 6
   f. 2
   g. 10
   h. 1
   i. 3
   j. 4

2. a. 4
   b. 6
   c. 7
   d. 1
   e. 8
   f. 3
   g. 2
   h. 9
   i. 10
   j. 5

3. Explained to the satisfaction of the instructor.

4. a. Mothering ability
   b. Wool characteristics
   c. Carcass development and conformation
   d. Uniformity with the flock

5. a. Wool growth
   b. Carcass quality
   c. Economic traits (feed lot traits)
   d. Growth (Market weight)

6. Any three explained to the satisfaction of the instructor.

   a. Better selection of replacement ewes
   b. Indicates breeding efficiency
   c. Guides the removal of undesirable traits
   d. Allows the tracing of ancestral lines

ANSWERS TO TEST

7. Terms explained to the satisfaction of the instructor.

8. A. 1 year - yearling

   B. 4 years or more - mature sheep

9. a. Buy at correct age

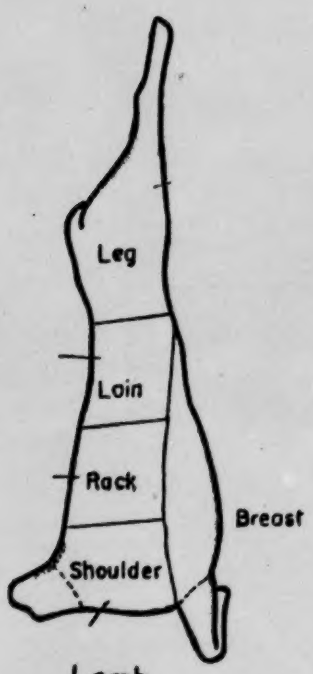
   b. Feed quality lambs

   c. Consider the fleece

   d. Learn their origin

10. Answers as on TM 5

11. Diagram should be labelled as shown:



Lamb

LIVESTOCK TYPES

UNIT V

TYPES OF HORSES

TERMINAL OBJECTIVE

Upon completion of this unit, the student will be able to identify types, classes, and breeds of horses, outline a breeding system to fit his/her needs, and be able to select a good horse based on desirable characteristics of horses and other methods of selection. This knowledge will be evidenced through demonstration and by scoring 85 percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student will be able to:

1. Match terms associated with horses to the correct definitions
2. Match types of light horses to their use
3. List the four types of work horses
4. Match breeds of light horses to their correct characteristics
5. Match breeds of work horses to their correct characteristics
6. Identify as true or false statements about the different methods of breeding horses
7. List on a picture of a horse the desirable characteristics of the various body areas, and identify parts.
8. List the four methods of selecting a horse
9. List two purposes of a breed association
10. Identify four common horse markings
11. Explain briefly two common conditions of unsoundness in horses

LIVESTOCK TYPES

UNIT V

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheet
2. Provide students with Information and Assignment Sheets
3. Make transparencies
4. Discuss Terminal and Specific Objectives
5. Discuss Information and Assignment Sheets
6. Introduce unit by explaining the terminology provided on the Information Sheet
7. Provide pictures of the various horse breeds as you explain about them
8. Use examples in explaining the horse breeding systems
9. Summarize unit by reinforcing the desirable characteristics of horses and methods of selection
10. Assist students in completing Assignment Sheet
11. Give Test

Students:

1. Read Objective Sheet
2. Study Information Sheets
3. Complete Assignment Sheet
4. Take Test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objective Sheet
2. Information Sheets

INSTRUCTIONAL MATERIALS

3. Transparency Masters

   TM 1 - PARTS OF A HORSE

   TM 2 - DESIRABLE CHARACTERISTICS OF HORSES

   TM 3 - DESIRABLE CHARACTERISTICS OF HORSES

   TM 4 - HEAD AND LEG MARKINGS OF HORSES

   TM 5 - UNSOUNDNESS IN HORSES

4. Assignment Sheet

   #1 - Outline a Horse Breeding System

5. Test

6. Answers to Test

References:

1. Ensminger, M.E. Horses and Horsemanship. Danville, Illinois: The Interstate Printers and Publishers Inc. 1977.

2. Hunsley, Roger E; Beeson, W. Malcolm; and Nordby, Julius E. Livestock Judging, Selection, and Evaluation. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1978.

3. Bogart, Ralph. Scientific Farm Animal Production. Minneapolis: Burgess Publishing Company, 1977.

4. Able, Bill V.; Allen, Dell M.; Hines, Robert H.; McKee, Miles. Animal Science and Industry Laboratory Manual. Dubuque, Iowa: Kendall/Hunt Publishing Company, 1978.

LIVESTOCK TYPES

UNIT V

INFORMATION SHEET

I. Terms and Definitions

A. Mare - A mature female horse four years or older; five years or older in Thoroughbreds

B. Stallion - A male horse four years old or over; five years or older in Thoroughbreds

C. Colt - A young stallion under three years of age; under four in Thoroughbreds

D. Foal - A young, unweaned horse of either sex

E. Broodmare - A mare kept for breeding purposes

F. Canter - A slow, restrained three-beat gait in which the two diagonal legs are paired, producing a single beat which falls between the beats of the other unpaired legs

G. Dam - Female parent of a horse

H. Filly - A young female horse under three years of age; under four for Thoroughbreds

I. Heterozygous - Having like genes which can be present for any characteristic

J. Gelding - A male horse that was castrated before reaching maturity

K. Maiden - A mare that has never been bred

L. Mustang - Native horse of the western plains

M. Rack - A fast, flashy, unnatural, four-beat gait in which each foot meets the ground separately at equal intervals

N. Stock horse - In the West it designates a cow horse

O. Stud - A male horse (Stallion) kept for breeding

P. Running walk - A slow, four-beat gait, intermediate in speed between the walk and rack

Q. Slow gait - A slow, animated, four-beat gait, similar to the rack

R. Unsoundness - Those more serious abnormalities that affect the serviceability of the horse

INFORMATION SHEET

II. Types and Classes of Light Horses According to Use

A. Light Horses

1. Stand 14-2 to 17 hands high
2. Weigh 900 to 1,400 pounds
3. Used primarily for riding, driving or racing, or utility purposes on the farm

B. Riding Horses

1. Three- and five-gaited saddle horses
    a. Generally of American saddle horse breeding
    b. Three-gaited = walk, trot and canter
    c. Five-gaited = 3 above, slow gait, and rack
    d. Must also possess superior conformation, perfect manners, and superior action
2. Walking Horses
    a. Mostly of the Tennessee walking horse breed
    b. Three gaits = walk, running walk, and canter
    c. Possess easy gaits and wonderful dispositions
3. Stock Horses
    a. Largest single class of light horses in the U.S.
    b. Mixed breeding; most predominantly Mustang
    c. Must be hardy, agile, fast, and sure-footed
4. Polo Mounts
    a. Adapted for use in playing the game of polo
    b. Of mixed breeding; most predominantly Thoroughbred
5. Hunters and Jumpers
    a. Used in following the hounds in fox hunting

INFORMATION SHEET

        - b. Mostly Thoroughbreds
    - 6. Ponies for Riding
        - a. Children's mounts
        - b. Kind and gentle in disposition
- C. Racehorses
    - 1. Running racehorses
        - a. Mainly Thoroughbred
    - 2. Quarter racehorses
        - a. Derived name from exceptional speed in quarter mile
        - b. Most Quarter horses used to work cattle
    - 3. Harness racehorses
- D. Driving Horses
    - 1. Heavy Harness horses
        - a. Hackney breed
        - b. Also known as carriage horses
    - 2. Fine Harness horses
    - 3. Roadsters
    - 4. Ponies for driving

III. Types and Classes of Work Horses and Mules

- A. Work horses
    - 1. Draft horses
        - a. Ultimate in power type horses
        - b. Weigh 1600 lbs and up
    - 2. Wagon horses
        - a. 1300 to 1600 pounds
        - b. Limited use with milk and laundry wagons

INFORMATION SHEET

3. Farm Chunks

4. Southerners

B. Mules

1. Draft mules

2. Sugar mules

3. Farm mules

4. Cotton mules

5. Pack and mine mules

IV. Breeds of Light Horses

A. American Saddle Horse

1. Bay, brown, chestnut, grey, black, or golden in color

2. Stand 15-16 hands high and weigh 1,000 to 1,200 lbs.

3. Used almost exclusively as 3 - or 5-gaited saddle horses, primarily as pleasure horses

B. Appaloosa

1. Many coat patterns and colors

2. Used for stock horses, pleasure horses, parade mounts, and racehorses

C. Arabian

1. Oldest breed of horses

2. Medium to small in size; 14 to 15-1 hands

3. Bay, grey, and chestnut predominant colors

4. Primarily a saddle horse

D. Hackney

1. Most prominent of the five breeds of heavy harness horses

2. Today mainly a show animal

INFORMATION SHEET

E. Morgan

  1. Black, brown, bay, and chestnut colors
  2. Today used as stock horse in the West, saddle horse in the East

F. Paint (Pinto)

  1. Spotted or two-tone horses of white and another color
  2. Used as stock horses, pleasure horses, and for showing and racing

G. Palomino

  1. Golden in color
  2. Used as stock, parade, pleasure, saddle, and fine harness horses

H. Pinto

  1. 50-50 color pattern
  2. Used as stock, saddle, and pleasure horses
  3. Especially superb as a show, parade, novice, stock, and pleasure horse

I. Pony of the Americas (POA)

  1. Appaloosa coloring
  2. Primarily for juniors who have outgrown Shetlands but who are not ready for horses

J. Quarter horse

  1. Adapted and used chiefly for racing up to distances of a quarter-mile and to work cattle with them
  2. Usually chestnut, sorrel, bay, or dun in color

K. Shetland Pony

  1. Smallest of all horses
  2. Noted for its hardiness and good disposition
  3. Used as show ponies, for racing, and as children's mounts

INFORMATION SHEET

L. Tennessee Walking horse

   1. Running walk gait is an all-day gait at a speed of 6-8 mph

   2. Originally a plantation horse, now a pleasure horse

   3. Ideal for the amateur or the person who rides infrequently

M. Thoroughbred

   1. Dominates running racehorsing

   2. Diverse use as saddle horses, polo horses, stock horses, hunters, etc.

   3. One-third of U.S. Thoroughbreds are bred in Kentucky

V. Breeds of Draft Horses

A. Belgian

   1. Noted for draftiness - widest, deepest, most compact and massive of any draft breed

   2. Extremely quiet, docile, and patient

B. Clydesdale

   1. Scotch breed noted for a prompt walk, with a good snappy stride and a short trot

   2. Unexcelled for show use in a six-horse hitch

C. Percheron

   1. Most widely distributed of all draft breeds during the draft horse era

   2. Noted for excellent temperament and longevity

D. Shire

   1. Tallest of all draft breeds

E. Suffolk

   1. Developed exclusively as a farm workhorse

INFORMATION SHEET

2. All are chestnut in color

3. Smaller than other drafters - 1,600-1,800 lbs.

VI. Systems of Breeding

A. Purebreeding

1. Breeding animals which possess common ancestry and distinctive characteristics

2. A highly specialized type of production

3. Only experienced breeders should attempt to produce purebreds as foundation stock to other purebred breeders

B. Closebreeding

1. Mating of closely related animals, such as sire to daughter, son to dam, and brother to sister

2. Results in less vigor and then no desirable outlet for horses of poor type or performance

3. Reasons for closebreeding

a. Increases homozygosity, thus the fastest method of fixing a desirable characteristic

b. Keeps relationship to a desirable ancestor highest

c. Selected inbred animals are more homozygous for desirable genes and transmit these genes with greater uniformity

4. Disadvantages

a. Increases the proportion of worthless stock produced

b. Rigid culling requires a large herd and finances

c. Must have excellent stock and be an excellent breeder

C. Linebreeding

1. Degree of relationship is not closer than half-brother and half-sister or matings more distantly related

2. Offers fewer possibilities both for good and harm than closebreeding

INFORMATION SHEET

3. Middle-of-the-road program the majority of average and small breeders can follow

D. Outcrossing

1. Mating animals that are members of the same breed but which show no relationship for four to six generations in the pedigree

2. Best for purebred breeders with average or below average herds

3. Safe system of breeding, since two unrelated animals will probably not carry the same undesirable genes

E. Grading Up

1. System of breeding in which a purebred sire of a given breed is mated to a native or grade female

2. Commonly used on the western range where mares of Mustang background are graded up by using a stallion of a certain breed

3. The greatest single step toward improved quality and performance occurs in the first cross

F. Crossbreeding

1. Crossbred animals possess greater heterozygosity than outcross animals with added hybrid vigor

2. This method of breeding has a place in increasing vigor, growth rate, and efficiency of production, and in creating new breeds

VII. Desirable Characteristics of Horses

A. Balance

B. Smoothness

C. Quality

1. Fine, glossy hair coat

2. Skin pulled tightly over the muscles and bones

3. Desirable bone

INFORMATION SHEET

D. Head and Neck

    1. Medium length

    2. Clear, alert eyes with good width between the eyes

    3. Large open nostril

    4. Thin and pliable neck

E. Forequarter

    1. 45° angle from top of the withers to the point of the shoulder

    2. Long shoulder means a longer stride

    3. Deep, wide chest

    4. Muscling give the appearance of an inverted "V" on the floor of the chest

F. Body

    1. Area from the top of the withers to the floor of the chest should be deep with a set of well-sprung ribs

    2. Withers clean and prominent

G. Rearquarter

    1. Long and well defined

    2. Wider at the base than at its top

H. Height

    1. Over 14 hands as mature horses

I. Parts of the horse (See TM 1)

VIII. Selection of Horses

A. Based on Individuality

    1. Price the rider can afford

    2. Horse not too spirited for the rider's skills

    3. Horse size kept with the size and weight of the rider

INFORMATION SHEET

4. Master a 3-gaited horse first

5. Breed and color, other conditions being equal

6. Horse well suited to the type of work to be performed

B. Based on pedigree

1. If complete in terms of records of performance of the ancestors, pedigree can predict the usefulness of the individual and the probable prepotency as a breeding animal

2. Important where animals are too thin or so young their merit cannot be ascertained

3. Important where selection is being made between animals of comparable merit

C. Based on Show-ring winnings

1. Used by breeders of pleasure horses

2. Valuable in indicating the utility value of the horse

D. Based on performance testing

1. Easier to apply than progeny testing because it is an individual matter

E. Progressive breeders will use all four methods of selection

IX. Breed Registration Associations

A. Group of breeders banded together to:

1. Record the lineage of their animals

2. Protect the purity of the breed

3. Promote the interest of the breed

B. Associations for stock horses

1. Appaloosa

2. Palomino

3. Quarter horse

C. Write to individual associations for registry information

INFORMATION SHEET

X. Horse Colors and Marks

  A. Colors and their importance

    1. Are a means of horse identification
    2. Specific colors may be required for registration
    3. Are used to separate different breeds

  B. Body color

    1. Bay
    2. Black
    3. Brown
    4. Chestnut (sorrel)
    5. White
    6. Dun (buckskin)
    7. Gray
    8. Palomino
    9. Pinto (calico or paint)
    10. Roan

  C. Head markings (TM 4)

    1. Are used for identification
    2. Most common patterns
      a. Star
      b. Stripe
      c. Blaze
      d. Snip
      e. Bald

  D. Leg markings (TM 4)

    1. Are used for legal descriptions for identification

INFORMATION SHEET

2. Marking corresponds with the amount of white on the leg. Example: "Pastern" - white extends from the coronet to and including the Pastern

XI. Unsoundness in Horses

A. Causes

1. Inheritance

2. Overstressing

3. Stressing the immature animal

4. Accident and injury

5. Nutritional deficiencies

B. Unsoundness of the limbs

1. Most common and most economically important

2. See a competent book on horse management for a complete listing of problems, preventions and treatments

C. Locations of common unsoundness

1. Head

2. Withers and shoulders

3. Front limbs

4. Rear limbs

5. See transparency #5

D. General unsoundness

1. Heaves - difficulty in expelling breath

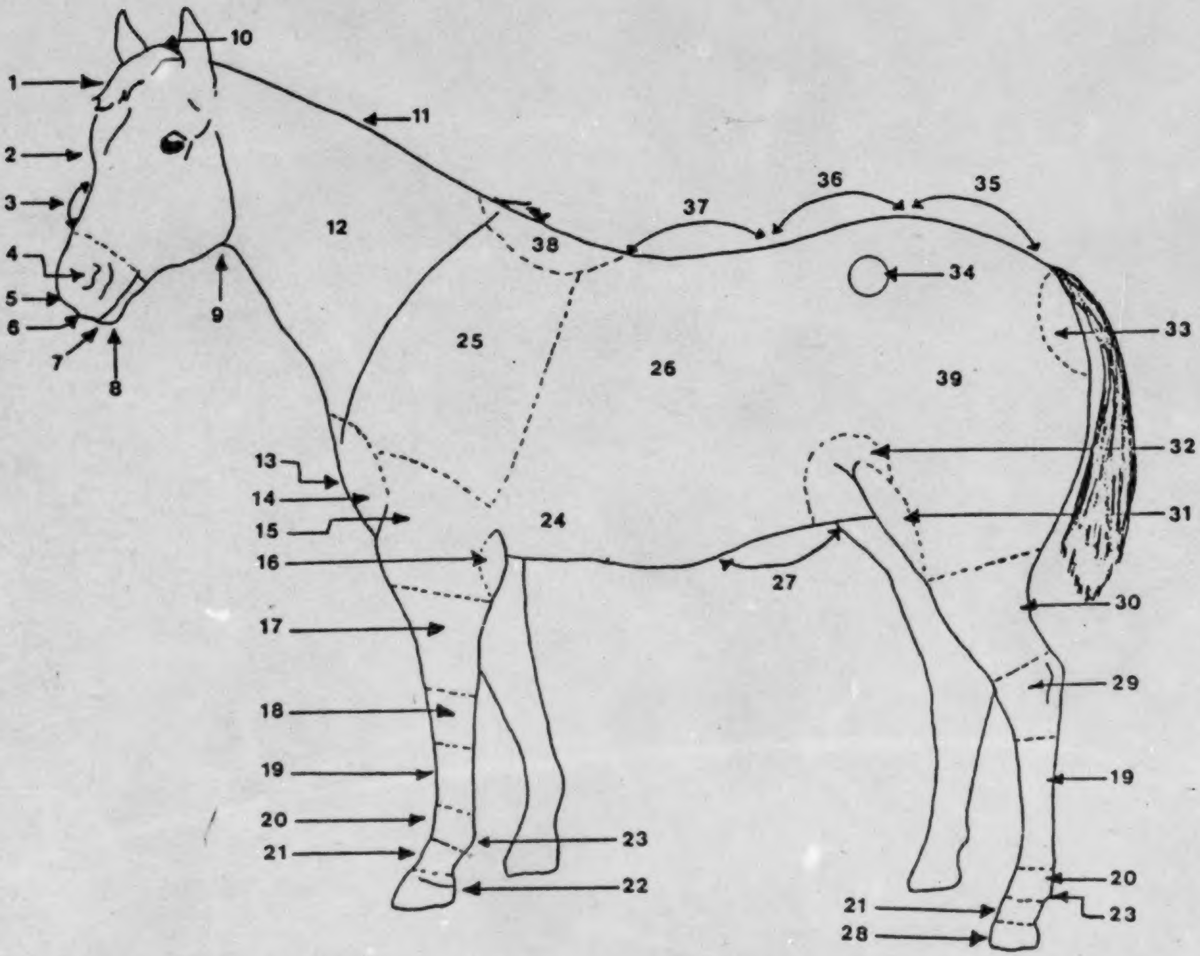
2. Hernia or rupture

3. Roaring - noisy breathing

4. Thickwind - difficulty breathing

PARTS OF A HORSE

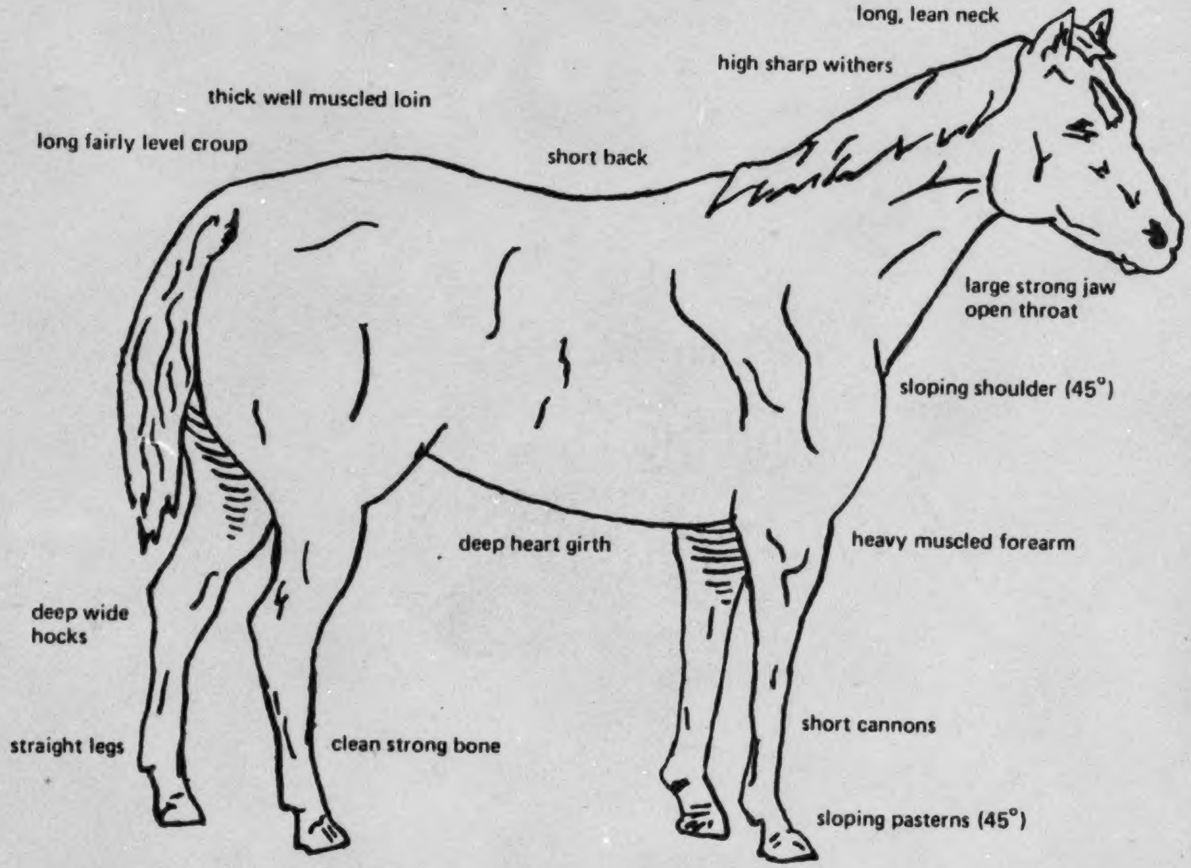
1. FOREHEAD
2. FACE
3. BRIDGE OF NOSE
4. NOSTRIL
5. MUZZLE
6. UPPER LIP
7. LOWER LIP
8. UNDER LIP
9. THROAT LATCH
10. POLL
11. CREST
12. NECK
13. POINT OF SHOULDER
14. CHEST
15. ARM
16. ELBOW
17. FOREARM
18. KNEE
19. CANNON
20. ANKLE
21. PASTERN
22. CORONET
23. FETLOCK
24. GIRTH
25. SHOULDER
26. BARREL
27. ABDOMEN.
28. HOOF
29. HOCK
30. GASKIN
31. STIFLE
32. FLANK
33. BUTTOCK
34. POINT OF HIP
35. CROUP
36. LOIN
37. BACK
38. WITHERS
39. THIGH



TM I

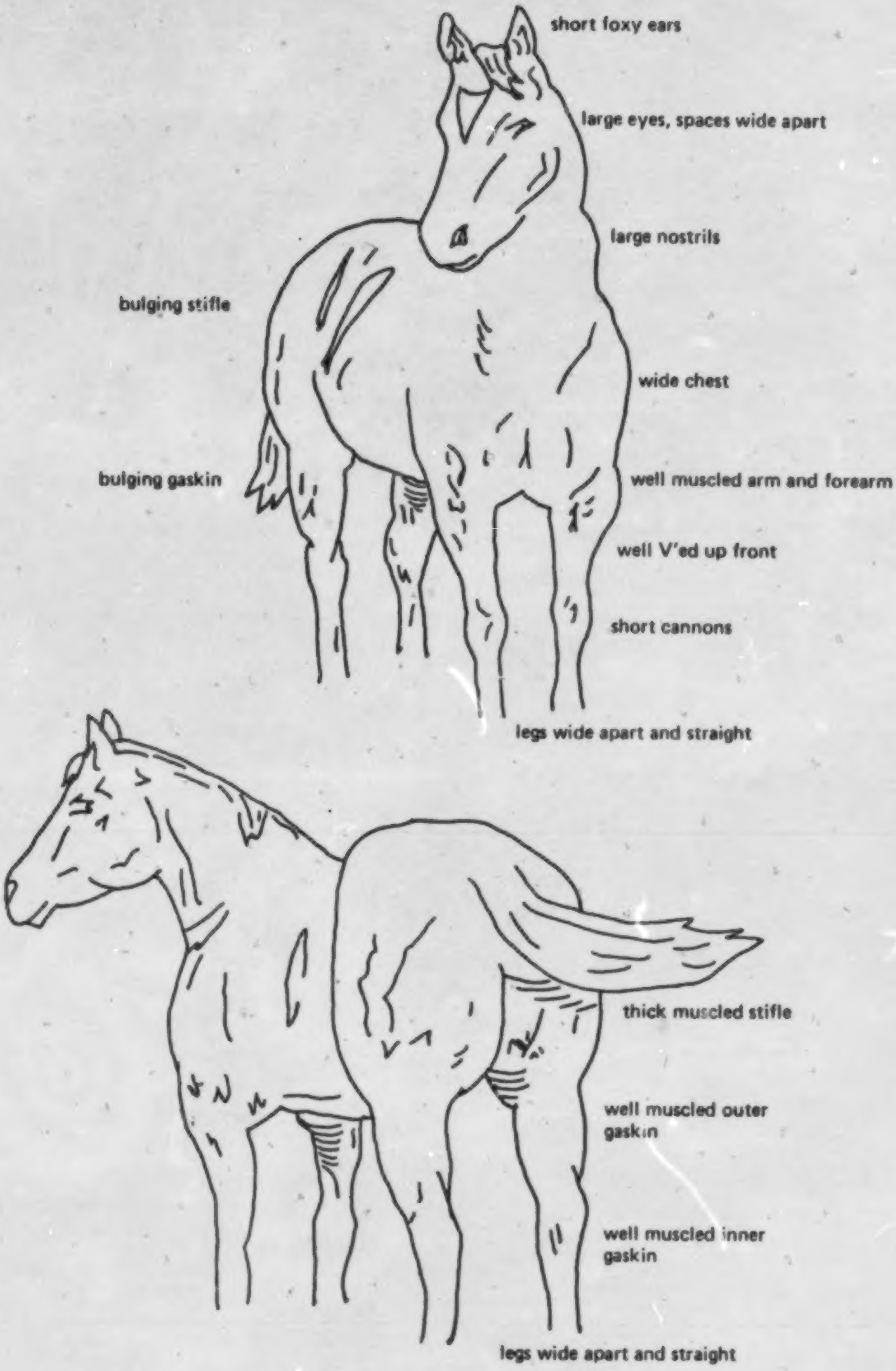
SA U5-16

SD US-18



Desireable Characteristics of Horse

TM


short foxy ears
large eyes, spaces wide apart
large nostrils
bulging stifle
wide chest
bulging gaskin
well muscled arm and forearm
well V'ed up front
short cannons
legs wide apart and straight
thick muscled stifle
well muscled outer gaskin
well muscled inner gaskin
legs wide apart and straight

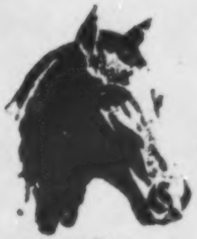
Desireable Characteristics of [illegible]

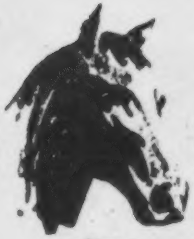
T/I

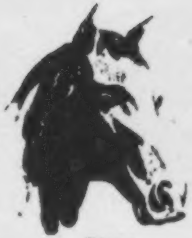
(15)

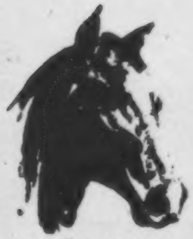
HEAD and LEG MARKINGS

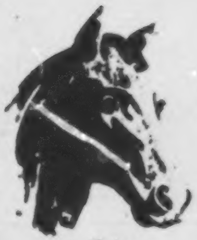
On Horses

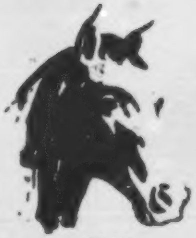

Star

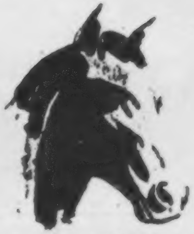

Stripe

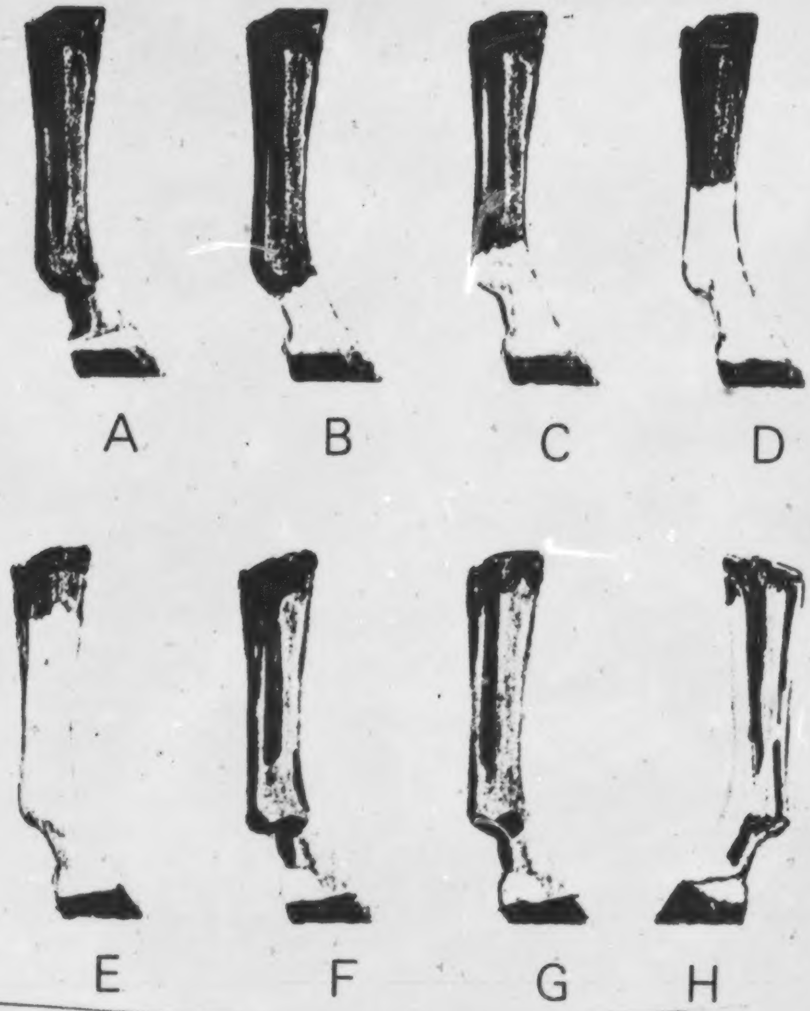

Blaze


Star, stripe, and snip


Snip


Bald


Star and stripe



A Coronet

B Pastern

C Ankle

D Half stocking

E Stocking

F White heels

G White outside heel

H White inside heel

TM 4

SDU5-26

Unsoundness in Horses

SD U5-211

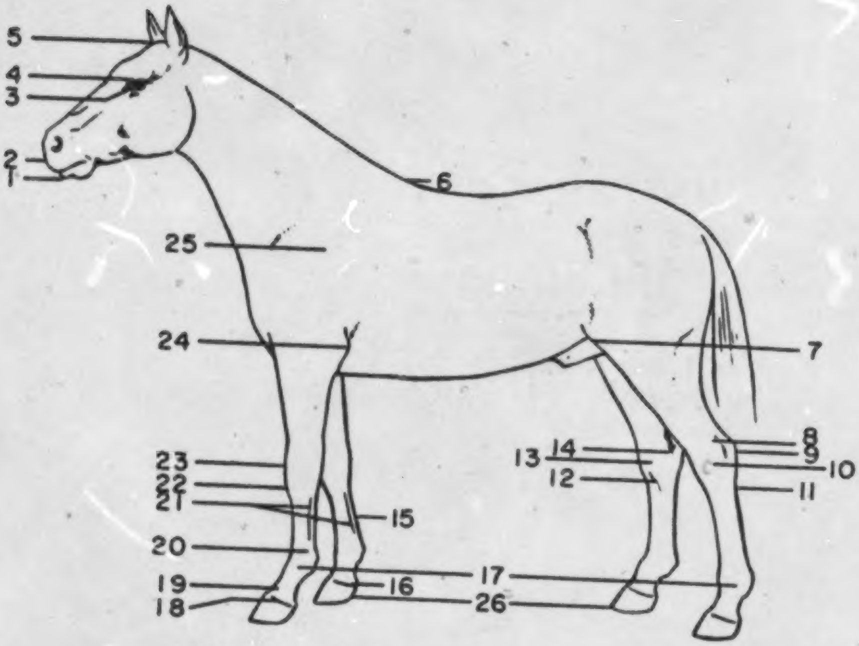
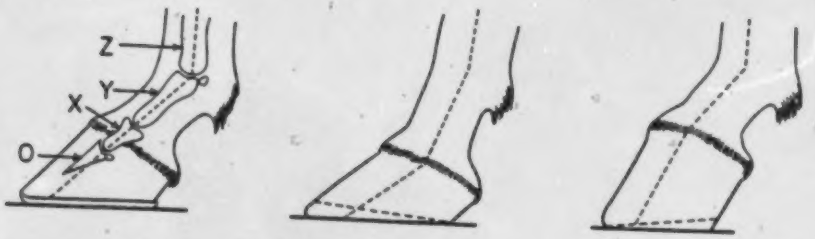


Fig. 6-1. Location of points of common unsoundness in horses.

1. Undershot jaw
2. Parrot mouth
3. Blindness
4. Moon blindness
5. Poll evil
6. Fistulous withers
7. Stifled
8. Thoroughpin
9. Capped hock
10. Stringhalt
11. Curb
12. Bone spavin or jack
13. Bog spavin
14. Blood spavin
15. Bowed tendons
16. Sidebones
17. Cocked ankles
18. Quittor
19. Ringbone
20. Wind-puffs
21. Splints
22. Knee-sprung
23. Calf-kneed
24. Capped elbow
25. Sweeney
26. Contracted feet, corns, founder, thrush, quarter crack or sand crack, scratches or grease heel

General: heaves, hernia, roaring, thick wind



Proper and faulty Hoof posture

O – coffin bone
X – short pastern bone
Y – long pastern bone
Z – Cannon bone

(correct posture is [illegible] 45°)

TM5

LIVESTOCK TYPES

UNIT V

ASSIGNMENT SHEET #1: Outline A Horse Breeding System

Assume you are to manage a horse stable that is to raise and breed purebred horses. The horses will be sold mainly as stock horses and pleasure horses. You, an average breeder, do not have a tremendous amount of capital to use. Select an appropriate breed and then outline a breeding system that you feel will work best for you.

LIVESTOCK TYPES

UNIT V

TEST

1. Match the terms on the right to the correct definitions

_____a. A young female horse under three years of age

_____b. A male horse four years old or over

_____c. A fast four-beat gait

_____d. A slow, restrained, three-beat gait

_____e. A mature female horse four years of age or older

1. Stallion
2. Canter
3. Mare
4. Filly
5. Rack

2. Match the types of light horses on the right to their use.

_____a. Used in playing the game of polo

_____b. Heavy harness horse

_____c. Used in following hounds in fox hunting

_____d. Children's mounts

_____e. Used in cutting cattle

1. Ponies
2. Jumpers
3. Polo Mounts
4. Stock horses
5. Driving horses

3. List the four types of work horses

a.

b.

c.

d.

TEST

4. Match the light horse breeds on the right to their correct characteristics

_____a. For racing distances up to a quarter mile

_____b. Smallest of all horses

_____c. Oldest horse breed

_____d. Golden color

_____e. Originally a plantation horse

_____f. Dominates running racehorses

1. Shetland Pony
2. Arabian
3. Thoroughbred
4. Palomino
5. Quarter Horse
6. Tennessee Walking Horse

5. Match the work horse breeds on the right to their correct characteristics

_____a. Tallest of all draft breeds

_____b. Developed exclusively as a farm workhorse

_____c. Noted for draftiness

_____d. Excellent temperament and longevity

_____e. Used in shows

1. Belgian
2. Clydesdale
3. Percheron
4. Shire
5. Suffolk

6. Identify as true or false the following statements about the different methods of breeding horses.

T F a. Only experienced breeders should attempt to produce purebreds as foundation stock.

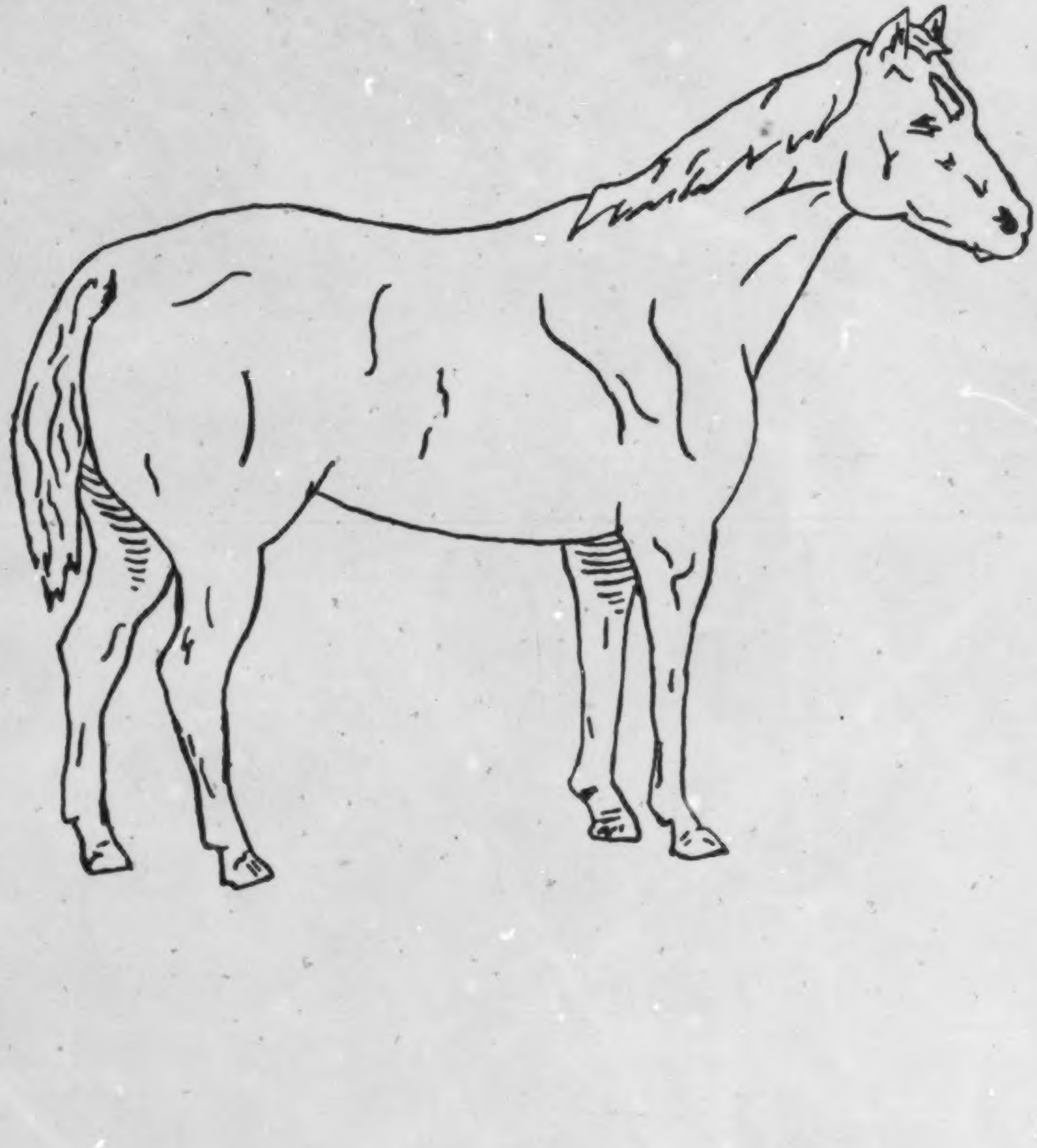
T F b. Closebreeding is a system where the degree of relationship between the two is no closer than half-brother and half-sister.

T F c. Linebreeding requires large herds and finances.

T F d. Outcrossing is a safe system of breeding.

TEST

7a. List on the picture below five desirable characteristics of horses.



7b. Label parts of the horse

1.
2.
3.
4.
5.
6.
7.
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9.
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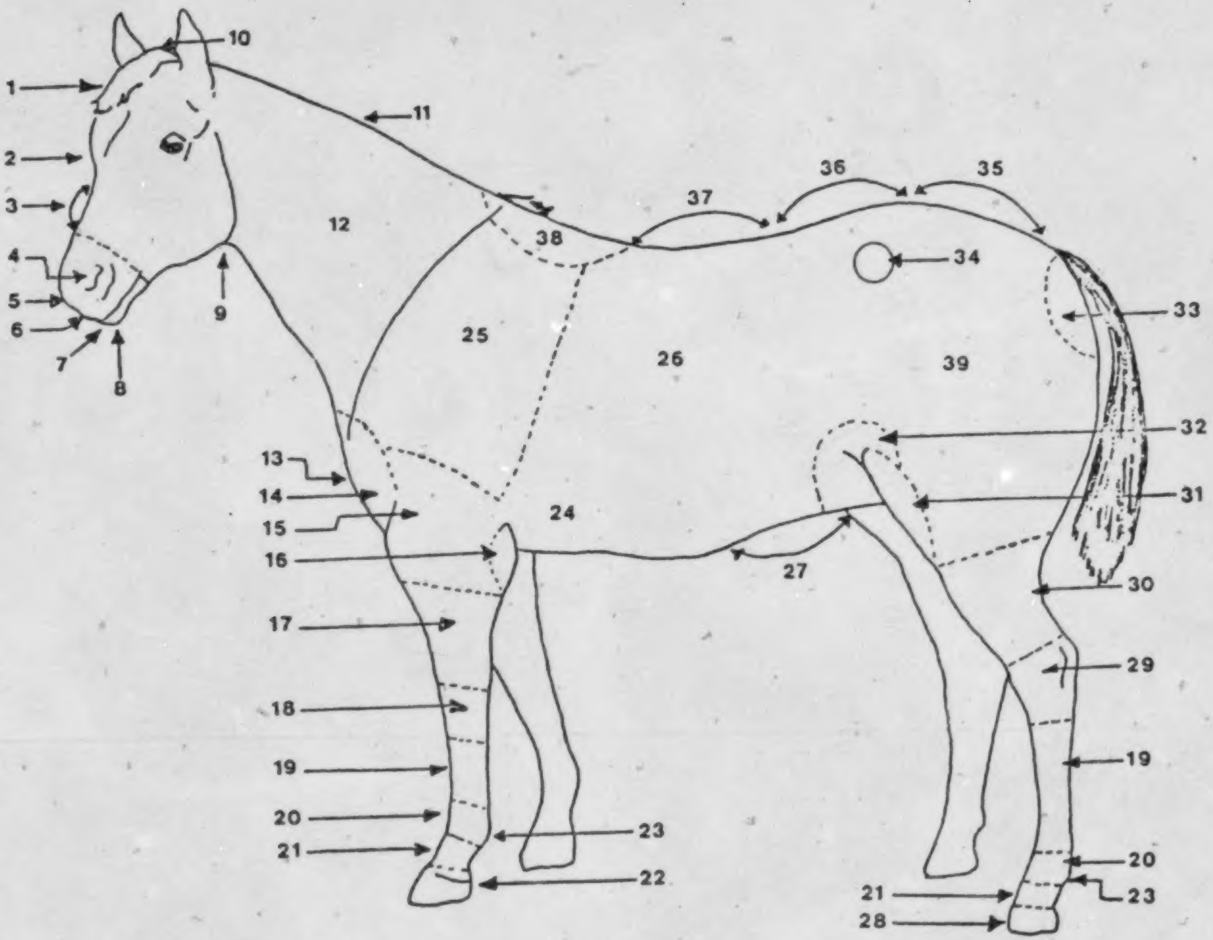


TEST

8. List the four methods of selecting a horse.

a.

b.

c.

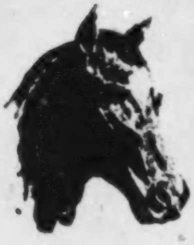
d.

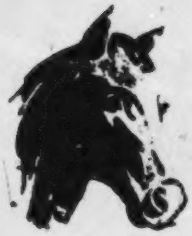
9. List two purposes of a breed association.

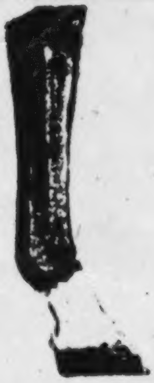
a.

b.

10. Identify by name, the four horsemarkings shown below:


A.


B.


C.

D.

A. ____________________

B. ____________________

C. ____________________

D. ____________________

TEST

11. Briefly explain the following unsound conditions of horses, including location, severity and cause.

    a. Ringbone

    b. Bowed tendons

LIVESTOCK TYPES

UNIT V

ANSWERS TO TEST

1. a. 4 d. 2
b. 1 e. 3
c. 5

2. a. 3 d. 1
b. 5 e. 4
c. 2

3. a. Draft
b. Wagon
c. Farm Chunks
d. Southerners

4. a. 5 d. 4
b. 1 e. 6
c. 2 f. 3

5. a. 4 d. 3
b. 5 e. 2
c. 1

6. a. T
b. F
c. F
d. T

7. Any five of those listed on TM 2 and TM 3 and parts as on TM 1

8. a. Based on individuality
b. Based on pedigree
c. Based on show - ring winnings
d. Based on performance testing

ANSWERS TO TEST

9. Any two of the following:

   a. Record the lineage of their animals

   b. Protect the purity of the breed

   c. Promote the interest of the breed

10. A. Star C. Pastern

    B. Snip D. Full stocking

11.

LIVESTOCK PROGRAMS

UNIT 1

SWINE PRODUCTION SYSTEMS

TERMINAL OBJECTIVE

Upon completion of this unit, students will be able to list and discuss the basic capital, labor, facilities and management requirements of the various swine production enterprises.

SPECIFIC OBJECTIVES

After completion of this unit, students will be able to:

1. Match terms concerning swine production programs with their correct definitions.
2. List five of the seven factors affecting the present economic state of the swine and pork industry.
3. Mark true or false six questions concerning the positive and negative aspects of swine production.
4. Complete a chart comparing the various aspects of the three basic farrowing systems.
5. a. List two advantages and two disadvantages of high investment facilities.

   b. List two advantages and two disadvantages of low investment facilities.
6. Select from a list four reasons for engaging in a finishing program.
7. List four managerial requirements unique to purebred swine operations.
8. Select from a list management skills of swine
9. Select the swine program best suited to your operation (Assignment Sheet #1)
10. Develop a calendar of management activities for a chosen production system. (Assignment Sheet # 2).

LIVESTOCK PROGRAMS

UNIT 1

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheet
2. Provide students with Information and Assignment Sheets
3. Make Transparencies
4. Discuss Terminal and Specific Objectives
5. Discuss Information and Assignment Sheets
6. Organize a field trip to area swine programs (optional)

Students:

1. Read Objectives
2. Study Information Sheets
3. Work Assignment Sheets and turn in to instructor
4. Participate in field trip (optional)
5. Take Test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information Sheets
3. Information Sheet Supplement:
    - #1 - Selecting a Swine Program Compatible with Your Farm
    - #2 - Suggested Sizes for, and Capital Requirements of Various Pork Production Systems

INSTRUCTIONAL MATERIALS

4. Transparency Master

   TM 1 - PERFORMANCE IN THREE FINISHING HOUSES

   TM 2 - CAPITAL REQUIREMENTS OF VARIOUS PORK PRODUCTION SYSTEMS

   TM 3 - OPERATION EVALUATION

   TM 4 - CALENDAR OF MANAGEMENT Activities For a Feeder Pig Producer

5. Assignment Sheets

   #1 - Selecting a Swine Program

   #2 - Developing a Calendar of Management Activities

6. Test

7. Answers to Test

References:

1. Pond, W.G., Maner, J.H. Swine Production in Temperate and Tropical Environments. San Francisco: W.H. Freeman and Company, 1974.

2. Pork Industry Handbook, Co-operative Extension Service, Manhattan, Kansas.

3. Kansas Farm Management Handbook, Cooperative Extension Service, Manhattan, Kansas.

4. Doane's Farm Management Guide, 14th Ed., Doane Agricultural Service, Inc. 1980.

LIVESTOCK PROGRAMS

UNIT 1

INFORMATION SHEET

I. Terms and Definitions

  A. Feeder pig enterprize - A production system involving breeding, gestation and farrowing of sows with production of a 35-50 lb. pig as the marketable commodity

  B. Finishing enterprize - The growing of a feeder pig from 40 lbs to market weight

  C. Market hog - Hogs to be sold for slaughter at marketable weights. (200-240 lb.)

  D. Confinement - The rearing of animals within enclosed buildings or small restricted areas

  E. Ringing - The placing of rings in the snout of swine to prevent rooting

  F. Tusking - The removing of needle teeth in the newborn pig or mature boars

  G. Farrow-to-Finish - An enterprize which includes all phazes of swine production

  H. Controlled Environment - A facility with self regulated heat and ventilation independent of natural weather

II. Factors which Affect the Present Economic State of the Swine Industry

  A. Current Economic Phazes of Production

    1. Expansion

    2. Liquidation

    3. Price Movements

  B. Consumer condition

    1. Per capita income

    2. Per capita consumption of red meat

  C. Meat prices

    1. Opportunity costs of different meats

INFORMATION SHEET

    a. Pork
    b. Beef
    c. Poultry

  D. Import and Export Figures

  E. Production costs and profit margins

    1. Feed
    2. Labor
    3. Finance

  F. New Management Trends

    1. Solar heated confinement buildings
    2. Self contained heating through natural methane
    3. New body type trends
    4. Research breakthroughs

  G. Government Regulations

    1. Market Controls
    2. Processing Regulations
    3. Manure disposal

III. Positive and Negative Aspects of Swine Production

  A. Advantages of swine production

    1. Low capital requirements to enter
    2. Rapid return on investment (four-six months)
    3. Buildings and equipment can be portable
    4. Many production tasks can be done by unskilled labor
    5. Old or existing buildings can be utilized
    6. System can be upgraded relatively easy
    7. Low land requirement
    8. Pork production can be an alternative market for grain

INFORMATION SHEET

B. Disadvantages of Swine Production

1. Rapid turnover of production may lead to market chasing and speculation

2. Low investment systems often require high labor

3. Manure disposal can result in odor, fly and run off problems

4. To upgrade, or to lower labor needs, often requires considerable capital outlay

5. Disease control is of constant concern

6. The market can be highly volatile at times

IV. Comparisons of Farrowing Systems (Information Sheet 1)

A. Low Investment - Pasture farrowing

1. Labor Requirements

a. Relatively high per pig produced

b. Many cleaning and feeding tasks can be done only be hand

c. Many of the production tasks can be performed by unskilled labor

2. Capital Requirements

a. Lowest capital requirements of all systems

b. Facilities need not be operated at maximum capacity as minimal capital is tied up

3. Facilities and Equipment

a. Minimal facilities other than shelter are needed

b. Equipment must be portable to allow inter-pasture movement

c. ¼ - 1/10 of an acre of pasture needed per brood sow and litter

d. Straw or dry absorbant bedding will be required

INFORMATION SHEET

4. Feed Requirements
    a. Grain and protein supplement
    b. Good pasture can lower feed requirements by as much as 50%
5. Special Management Considerations
    a. Shade must be provided in summer
    b. Plan farrowing dates to fall in favorable weather seasons
    c. Parasite control of greater concern
    d. Predators

B. Low Investment Confinement System

1. Labor Requirements
    a. Relatively high per pig produced
    b. May be greater than a pasture system
    c. Many tasks can be performed by unskilled labor
    d. Many interfere with cropping enterprize
2. Capital Requirement
    a. Comparable to pasture system especially if existing buildings are used
    b. Is a secondary income source on a multiple enterprize farm
3. Facilities and Equipment
    a. Existing buildings can often be used
    b. Supplemental heat may be required in some areas
    c. Labor saving devices are usually kept to a minimum
    d. Manure handling equipment must be available
    e. Concrete slab floors will require bedding
    f. Pasture or dirt lots should be available for breeding herd and building overflow

INFORMATION SHEET

C. High Investment, High Intensity Confinement System

1. Labor Requirements
    - a. Two or more operators are required to insure availability of management
    - b. Low labor required per pig produced
    - c. Skilled labor may be required to maintain sophisticated equipment
    - d. Business and financial management will be a significant part of labor required
2. Capital required
    - a. Confinement facilities may require investments of $1500 per sow unit
    - b. A long term commitment to hog production is required to justify investments
3. Facilities and Equipment
    - a. Many labor saving devices will be used
    - b. The operator will require knowledge of equipment to best utilize and maintain it
    - c. A trade-off of labor for equipment justifies the investment
4. Special Management Skills Recommended
    - a. Financial management
    - b. Marketing management
    - c. Access to the latest technology concerning swine production
    - d. Labor relations, to work with hired help
    - e. Organizational skill to ensure maximum utilization of facilities
    - f. Self management to cope with the personal stress of high investment production operations

INFORMATION SHEET

V. High-Investment vs. Low-Investment Swine Finishing Facilities

A. High-Investment Facilities

1. Advantages

a. Highly mechanized,low labor

b. Environmentally controlled for maximum feed efficiency

c. Minimum labor required to clean and feed

d. Require relatively low amount of land

2. Disadvantages

a. Requires long term commitment to swine production

b. A large amount of capital is required

c. Disease travels rapidly in closed buildings

d. Overhead costs are high

e. Profit margins are often narrow

B. Low-Investment Facilities

1. Advantages

a. Require less initial capital outlay

b. Can be developed from converted buildings

c. Require lower level of skilled labor

d. Allows a person to be flexible in his operation without a long term commitment to hog production

2. Disadvantages

a. Often have high labor requirement per hog

b. Minimum mechanization requires manual labor

c. Often more load per hog is required

d. Older facilities may require much renovation

INFORMATION SHEET

C. Performance in three swine finishing type houses (Transparency #1)

	Open Front	Modified Open Front	Environmentally Regulated
	Fall and Winter Performance		
		(cold)	
Avg. daily gain (lb).	NA	1.68	1.62
Feed/pound gain (lb).	NA	3.06	2.88
		(ZoneHeat)	
Avg. daily gain (lb).	1.35	1.54	1.54
Feed/pound gain (lb).	3.61	3.23	3.22
Utility cost/pig/day	-	2.24¢	2.46¢
	Summer Performance		
Avg. daily gain (lb).	1.60	1.58	1.52
Feed/pound gain (lb).	3.05	3.06	3.13
Utility cost/pig/day	-	-	0.36¢

VI. The Finishing Program

A. Feeding on farm raised pigs

1. Generates additional income over that of feeder pig production only

2. This phaze of production is relatively low in labor

3. Can provide a market for excess grain

4. Lengthens rate of return versus marketing feeder pigs

B. Feeding purchased feeder pigs

1. Advantages

a. Capital turnover is high

b. Labor requirements are relatively low

c. Can provide a market for excess grain

INFORMATION SHEET

2. Disadvantages
   a. Pig handling costs can be high when purchasing pigs
   b. Some stunting of growth can occur from the transportation and handling of purchased pigs
   c. The fluctuating market can place high risk on profit margins

VII. Purebred Swine Production

A. Goals of the purebred producer
   1. Produce top quality registered seed stock
   2. Grow large numbers of superior animals
   3. Keep abreast of the latest type trends
   4. Develop a reputation for consistent production
   5. Maintain personal and business integrity

B. Management skills required
   1. Measuring of production characteristics
      a. Carcass quality
      b. Growth efficiency
      c. Structural soundness
      d. Reproductive performance
   2. The maintaining of constant genetic improvement
   3. Promotional skills - advertising and showing
   4. The maintenance of accurate breeding records
      a. Ancestery
      b. Ages of animals
      c. Test results
      d. Registration records

INFORMATION SHEET

5. Production practices
    a. Care of baby pigs
    b. Care of sow or gilt at parturition
    c. Handle and care of boars and sows at breeding time
    d. Animal identification (See TM 2)

C. Advantages of purebred production
1. Marketable livestock are of high value
2. A good operation is a source of pride
3. The producer can specialize

D. Disadvantages of purebred production
1. Capital is often tied up by a few animals
2. Time is needed to build up the business
3. Skill is required in selection of superior stock
4. Labor is usually higher in a purebred operation

VIII. Swine Management Skills

A. Practical veterinary skills
1. Castration
2. Injections of iron, vaccines and antibiotics
3. Treatment of water for internal parasite control
4. Spray or dust animals for external parasite control
5. Perform minor surgery to correct inquinal hernia
6. Take temperature of animals

B. Confinement hogs
1. Dock tails - prevents tail biting
2. Do not mix unfamiliar hogs
3. Remove sick or injured hogs promptly

INFORMATION SHEET

    4. Clip needle teeth of newborn to prevent injury

  C. Pasture production

    1. Ring noses to prevent rooting

    2. Maintain "hog tight" fences

    3. Develop a predator control system

IX. Selecting the "Right" Pork Production System (Information Sheet Supplement #2 and #3) (See TM 2)

  A. Describe the resource situation that exists on your farm

    1. Farm size and type

    2. Labor supply

    3. Feed grains available

    4. Capital availability

    5. Business organization and management experience

  B. Select the production systems that seem most compatible with your operation

  C. Evaluate each system as it would exist on your farm (See TM 4)

X. Developing a Calendar of Events For a Swine Enterprize (See TM 3, Assignment Sheet #2)

  A. Select farrowing dates

    1. Consider predicted marketing dates

    2. Consider weather (non-confinement)

    3. Consider labor availability

  B. Calendar is usually one year of one cycle breeding to breeding

  C. Include all regular management activities

    1. Breeding and removal of boars

    2. Farrowing

INFORMATION SHEET

3. Weaning
4. Vaccinations
5. Any animal movements between facilities
6. Marketing

D. Develop it for your operation

~~Table 5.~~ Capital Requirements, Investment per Full-Time Employee and Facility Costs for Various Pork Production Systems.

Production system	Investment per unit of production[a/] Buildings and equipment[b/]	 Start-up expenses[c/]	 Total investment	Capital to employ full-time man[d/]	Cost of facilities
A. Sow herd enterprises		per sow unit[a/]			per pig
1. Feeder pig production operations					
a. Low investment system	$ 345	$ 235	$ 580	$ 67,000	$4.20
b. High investment system	660	235	895	149,000	8.00
2. Farrow-to-finish operations					per cwt. gain
a. One litter pasture system[e/]	$ 285	$ 305	$ 590	$111,000	$3.75
b. Two litter pasture system	765	580	1345	84,000	4.40
c. Low investment confinement system	630	480	1110	74,000	3.45
d. High investment confinement system	1085	425	1510	162,000	6.00
B. Feeder pig finishing enterprises		per 100 purchased pigs[a/]			
a. Low investment system	$1985	$2050	$4035	$121,000	$2.20
b. High investment system	3200	2100	5300	199,000	3.50

a/ The sow is the unit for sow herd enterprise data; it denotes a mature female in production and includes a "supporting cost" of boars, replacement gilts and progeny in various stages of growth, with 14-16 market hogs sold yearly per sow unit. The unit for feeder pig finishing enterprises is *100 purchased pigs*; it assumes that feeders are fed on a continuous basis, and for each 100 pigs fed out per year, only about 1/3 are on hand at any one time.

b/ Estimated [illegible] cost per unit of production assuming the following building and equipment use intensity: for feeder pig production, farrow 4 times/year; for farrow-to-finish, farrow 6 times/year with high investment, 4 times a year with low investment, and 2 times/year with 2 litter pasture; for feeding purchased pigs, assume 3 groups/year fed in a set of facilities.

c/ Represents greatest negative cash flow in a start-up situation and includes cost of breeding stock for sow herd enterprises and cost of young pigs for feeder pig finishing enterprises.

d/ A full time man is assumed to work the equivalent of 300 ten hour days per year.

e/ The cycle is 12 months, with the breeding herd made up entirely of gilts farrowing once a year in spring or early summer.

Information sheet SE11-17

Supplement #7

Selecting a swine program
Compatible with Your farm.

Selecting ~~[illegible] situation for your farm~~

JM

~~Table~~ 1. Compatibility of ~~Various Pork Production Systems to Given Resource Situations~~.

	Sow herd enterprises						Feeder pig finishing enterprises	
	Feeder pig production operations		Farrow-to-finish operations					
Resource situation	Low invest. system	High invest. system	One litter pasture system	Two litter pasture system	Low invest. confine. system	High invest. confine. system	Low invest. system	High invest. system
A. Farm size and type								
1. Large grain farm			X	X	X	X	X	X
a. Is flat and black						X		X
b. Should be farmed in a rotation			X	X	X		X	
c. Is fenced			X	X				
2. Small acreage farm	X							
B. The management								
1. Short on hog production experience	X		X	X	X		X	
2. Wants to avoid risk	X			X	X			
3. Is better than average at:								
a. Buying and selling		X				X	X	X
b. Husbandry	X	X	X	X	X	X		
c. Mechanical work		X				X		X
d. Production scheduling and management		X				X		
e. Supervising labor	X	X			X	X	X	X
C. Capital position								
1. Is well capitalized and –		X	X	X	X	X	X	X
a. Willing to make long-term capital commitment		X				X		X
b. Can stand substantial short-term losses							X	X
2. Is short on capital	X		X	X	X		X	
3. Needs steady income flow	X	X				X		
4. Has older buildings available	X				X		X	
D. Labor supply								
1. Varies seasonally			X	X	X		X	
2. Is constant but limited	X	X				X	X	X
3. Can involve housewife	X	X						
4. Will hire necessary full-time help		X				X		X
E. Business organization								
1. Landlord tenant			X	X	X		X	
2. Owner operator								
a. Hog enterprise short-term (to be phased out)	X		X	X	X		X	
b. Hog enterprise long-term (sons coming into business)		X				X	X	X
3. Hog producing corporation		X				X		X

*An X indicates that the system at the top of the column fits the resource situation on the left. A blank means lack of compatibility.

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Info Sheet Supplement #2

Table 2 Suggested sizes for various pork production systems

Table ~~6. Minimum~~ Competitive Size and ~~Feasible Maximums~~ for Various Pork Production Systems.

Production system	Minimum competitive size: Number of sows	Minimum competitive size: Pigs produced per year	Feasible goal: Number of sows	Feasible goal: Pigs produced per year
A. Sow herd enterprises				
1. Feeder pig production operations				
a. Low investment system	36	540	150	2250
b. High investment system	100	1500	400	6000
2. Farrow-to-finish operations				
a. One litter pasture system	50	335	600	4000
b. Two litter pasture system	25	375	150	2250
c. Low investment confinement system	60	900	150	2250
d. High investment confinement system	100	1500	400	6000
B. Feeder pig finishing enterprises				
a. Low investment system	--	600	--	5000
b. High investment system	--	1500	--	15,000

Table 3 Capital Requirements of various pork production systems.

Production system	Investment per unit of production[a]: Buildings and equipment[b]	Investment per unit of production[a]: Start-up expenses[c]	Investment per unit of production[a]: Total investment	Capital to employ full-time man[d]	Cost of facilities
A. Sow herd enterprises		per sow unit[a]			
1. Feeder pig production operations					per pig
a. Low investment system	$ 345	$ 235	$ 580	$ 67,000	$4.20
b. High investment system	660	235	895	149,000	8.00
2. Farrow-to-finish operations					per cwt. gain
a. One litter pasture system[e]	$ 285	$ 305	$ 590	$111,000	$3.75
b. Two litter pasture system	765	580	1345	84,000	4.40
c. Low investment confinement system	630	480	1110	74,000	3.45
d. High investment confinement system	1085	425	1510	162,000	6.00
B. Feeder pig finishing enterprises		per 100 purchased pigs[a]			
a. Low investment system	$1985	$2050	$4035	$121,000	$2.20
b. High investment system	3200	2100	5300	199,000	3.50

[a] The sow is the unit for sow herd enterprise data; it denotes a [illegible] in production and includes a "supporting cast" of boars, replacement gilts and progeny in various stages of growth, with 14-16 market hogs sold yearly per sow unit. The unit for feeder pig finishing enterprises is 100 purchased pigs. It assumes [illegible] each 100 pigs [illegible] per year [illegible]

[b] Estimated 1977 [illegible] assuming [illegible] feeder pig [illegible] farrow 6 times/year with high investment, 4 times a year with low investment and 2 times/year with 2 litter pasture; for feeding purchased pigs, assume 3 groups/year fed in a set of facilities.

[c] Represents greatest negative cash-flow in a start-up situation and includes cost of breeding stock for sow herd enterprises and cost of young pigs for feeder pig finishing enterprises.

[d] A full-time man is assumed to work the equivalent of 300 ten hour days per year.

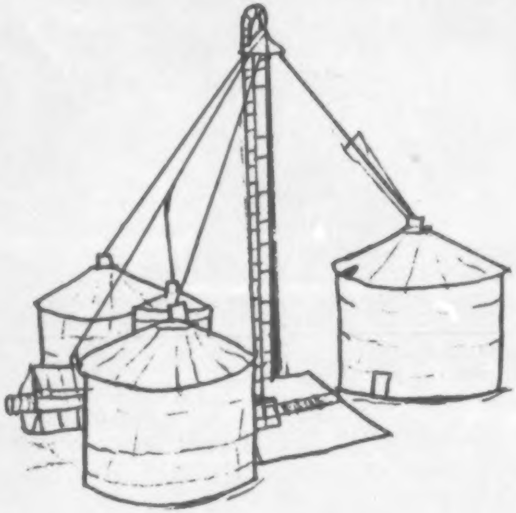
[e] The cycle is 12 months, with the breeding herd made up entirely of gilts farrowing once a year in spring or early summer.

TM 21

①. Performance in three Swine finishing type houses

	Open Front	Modified open front	Environmentally Regulated
Fall and Winter performance			
		(cold)	
Avg. daily gain (lb.)		1.68	1.62
Feed / pound gain (lb.)		3.06	2.88
		(zone Heat)	
Avg. daily gain (lb.)	1.35	1.34	1.54
Feed / pound gain (lb.)	3.61	3.23	3.22
Utility cost/pig/day	---	2.24¢	2.46
Summer Performance			
Ave. daily gain (lb.)	1.60	1.58	1.52
Feed / pound gain (lb)	3.05	3.06	3.13
Utility cost / pig / day	---	---	.36¢

- Evaluate Your
- Operation

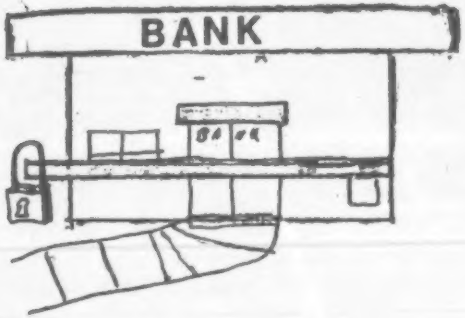


• Feed – Grain Available

• Management

• Facilities

• Labor



• Capital "$"

SB41 7M N

~~Table 1~~: Calendar of management activities for a feeder pig producer ~~production operation~~.

Stage	Days from breeding	Management practices
Pre breeding	30	Co-mingle gilts with sows or provide for fence line contact, also provide new boars fence-line contact with sows.
	14 to -28	Vaccinate sows for lepto; also, vaccinate for erysipelas if a problem.
	-7 to -14	Increase feed intake for gilts to 6-7 pounds per gilt per day for 1 to 2 weeks prior to breeding.
	-2	Spray for lice and mange.
Gestation	0	Breed, rotating boars daily; record known breeding dates.
	21 to 24	Remove boars.
	35 to 60	Pregnancy check, and sell any open females.
	90	Vaccinate sows for erysipelas, if a problem.
	105	Worm sows with broad spectrum wormer. Clean the farrowing house.
	108 to 110	Wash sows with warm water and soap, spray for lice and mange, and move to farrowing house; isolate farrowing house from all visitors. Start hand-feeding 3 to 4 pounds per sow per day; if constipation is a problem, add 20% wheat bran (or other laxative ingredients), and continue until 2 or 3 days after farrowing.
	112	Prepare auxiliary heat for pigs.
	Days after farrowing	
Farrowing-nursery	0 to 1	Dip navel cord in mild iodine solution. Clip needle teeth. Cut off tails. Ear notch gilts from good litters of 9 or more pigs. Complete farrowing record, including date, number of pigs farrowed, etc. Observe sows for MMA (mastitis, metritis, agalactia).
	1 to 3	Transfer pigs to equalize litters. Give iron shots.
	1 to 14	Castrate males.
	7 to 10	Provide creep feed for pigs.
	14 to 21	Give second iron shot, if needed. Move sows and pigs to nursery.
	28 to 42	Wean pigs and group by size.
	42	Worm pigs with broad spectrum wormer. Spray for lice and mange.
	56	Select replacement gilts from those ear-notched at birth.
	56 to 70	Sell pigs.

LIVESTOCK PROGRAMS

UNIT 1

ASSIGNMENT SHEET #1: Selecting a Swine Program

Using the Information Sheet Supplement, evaluate your farm operation and select the swine program compatible.

Justify your decision covering the following points:

A. Farm Size and Feed grain available

B. Management experience

C. Current Capital Position

D. Labor Supply

E. Present facilities available

LIVESTOCK PROGRAMS

UNIT 1

ASSIGNMENT SHEET #2: Developing a Calendar of Management Activities

Using the example calendar (TM 3) construct a systemmatic calendar of events to correspond with the swine program selected on Assignment Sheet #1.

Prepare on a basis of one year, or one complete breeding-to-market sequence with a listing of the number of sequences attempted per year.

LIVESTOCK PROGRAMS

UNIT I

TEST

1. Match the following terms below with their appropriate definitions on the right.

_____a. Tusking

_____b. Farrow-Finish

_____c. Market Hog

_____d. Confinement

_____e. Ringing

_____f. Controlled Environment

_____g. Feeder-pig enterprize

_____h. Finishing enterprize

1. Hogs at marketable weight to be sold for slaughter
2. The rearing of animals in a restricted area
3. Includes all growth phazes of swine
4. The removing of needle-teeth in the newborn pig or mature boars
5. The growing of feeder pigs to market weight
6. The placing of metal rings in the snout of swine to prevent rooting
7. A facility with self-regulated heat and ventilation equipment
8. The production and marketing of a pig from 35 lb - 50 lb. in weight.

2. List five of the seven factors affecting the present economic state of the swine and pork industry.

a.

b.

c.

d.

e.

3. Circle true or false in response to the following questions concerning the positive and negative aspects of swine production.

a. T F A major disadvantage of swine production is its relatively slow return in investment.

b. T F Disease control is of constant concern to the swine producer.

TEST

c. T F Most swine production tasks require highly skilled labor.

d. T F Manure disposal is of no great concern to the confinement swine operator.

e. T F Rapidly changing markets are an added bonus to the pork producer.

f. T F Most pork production systems have a relatively low land requirement.

4. Using the symbols explained below, complete the following chart comparing the various swine farrowing systems by placing the appropriate letters in the blanks.

	Special Facilities	Labor	Special Skills	Capital
High Investment Confinement	____	____	____	____
Low Investment Confinement	____	____	____	____
Pasture	____	____	____	____

H - Highest requirements

M - Moderate, or not overly significant

L - Lowest requirements

5. a. List two advantages and disadvantages of high investment facilities.

Advantages:

1.

2.

Disadvantages:

1.

2.

TEST

b. List two advantages and disadvantages of low investment facilities

Advantages:

1.

2.

Disadvantages:

1.

2.

6. Select from the list below, four reasons for engaging in a finishing program and place a check in the corresponding blank.

_____a. Can provide a market for excess grain

_____b. Can be an income supplement

_____c. Market fluctuations increase risk

_____d. Rapid return on investment when feeding feeder pigs

_____e. Labor requirements are low

_____f. Can lengthen rate of return versus selling of feeder pigs

7. List four managerial requirements unique to purebred swine operations.

a.

b.

c.

d.

TEST

8. Find a possible remedy on the right to correct the given swine problems.

Problem

_____a. The rooting of fences

_____b. Internal worms

_____c. Tail biting

_____d. Picking on an injured pig.

_____e. Ruptured boar pig.

_____f. Suspected illness.

_____g. Body lice.

_____h. Iron deficiency.

_____i. Baby pigs cutting udder and/or injuring litter mates.

Remedy

1. Perform minor surgery to correct hernia.
2. Take the animals' temperature and observe behavior.
3. Give correct iron injection.
4. Spray or dust for parasites.
5. Clip needle teeth at birth.
6. Dock tails of young pigs.
7. Ring pigs.
8. Remove animal.
9. Treat water or feed with an anthelmintic (worm treatment).

LIVESTOCK PROGRAMS

UNIT I

ANSWERS TO TEST

1. a. 4 e. 6
   b. 3 f. 7
   c. 1 g. 8
   d. 2 h. 5

2. Any five of the following:
   a. Consumer conditions
   b. Meat prices
   c. Government Regulations
   d. Imports & Exports
   e. New management trends
   f. Production costs and profit margins
   g. Current phaze of production

3. a. F d. F
   b. T e. F
   c. F f. T

4. The completed chart should look as follows:

	Special Facilities	Labor	Special Skills	Capital
High Investment Confinement	H	L	H	H
Low Investment Confinement	M	H	L	L,M
Pasture	L	M	M	L,M

5. Answered to the satisfaction of the instructor.

6. Those to be checked are:
   a. b. d. e.

ANSWERS TO TEST

7. Any four of the following:
    a. Skilled at promotion
    b. Skilled at genetic improvement
    c. Skilled at the evaluation of production performance
    d. Maintains accurate records
    e. True to integrity and honesty

8. a. 7
    b. 9
    c. 6
    d. 8
    e. 1
    f. 2(8)
    g. 4
    h. 3
    i. 5

LIVESTOCK PROGRAMS

UNIT II

PROGRAMS FOR SHEEP AND GOATS

TERMINAL OBJECTIVE

Upon completion of this unit, students will be able to list and discuss the various sheep production programs, show awareness of sheep management skills and select a sheep program best suited to their enterprize.

SPECIFIC OBJECTIVES

After completion of this unit, students will be able to:

1. Match terms with their definitions concerning sheep production systems and their management.
2. List the four methods of sheep production
3. Write two goals for each sheep production method
4. Identify four favorable factors of sheep production.
5. List three current trends that negatively affect the U.S. sheep industry.
6. Identify the common management skills required of a sheep producer.
7. Answer four true-false questions concerning proper wool and fleece handling.
8. List the two main purposes of goat production in the U.S.
9. List three management practices for goat production.
10. List the three considerations for starting in the sheep business
11. Select and justify one of the four systems of sheep production best adapted to your farm. (Assignment Sheet #1)

LIVESTOCK PROGRAMS

UNIT II

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheet
2. Provide students with Information Sheets
3. Discuss Terminal and Specific Objectives
4. Discuss Information and Assignment Sheets
5. Supply students with a list of the sheep operations in the area
6. Plan a field trip to a suitable sheep operation
7. Give Test

Students:

1. Read Objectives
2. Study Information Sheets
3. Participate in discussion
4. Participate in field trip
5. Complete Assignment Sheet
6. Take Test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information Sheets
3. Transparency Masters

   TM 1 - METHODS OF DOCKING AND CASTRATING LAMBS

   TM 2 - SHEEP DOCKING AND CASTRATING EQUIPMENT

   TM 3 - CATCHING AND RESTRAINING SHEEP

INSTRUCTIONAL MATERIALS

4. Assignment Sheet

    #1 - Selecting a Sheep Production System

5. Test

6. Answers to Test

References:

1. Ensminger, M.E. Sheep and Wool Science, Interstate Publishing Co, Danville, Ill.

2. Starting in the Sheep business, AF - 35 Cooperative Extension Service, Kansas State University, Manhattan. 1975.

3. Docking, Castrating and Ear Tagging Lambs, USDA Leaflet #551, Reprinted 1979.

4. Agricultural Statistics, (wool consumption) USDA Document, 1980.

5. "Cotton and Wool", Outlook & Situation, USDA Periodical February 1981.

6. A Dairy Goat for Home Milk Production, USDA Leaflet #538 J.

LIVESTOCK PROGRAMS

UNIT II

INFORMATION SHEET

I. Terms and Definitions

   A. Docking - The removal of lambs tails early in life

   B. Ewe - Female sheep

   C. Ram - Male sheep often called a 'buck'

   D. Elastrator - Instrument for placing a special rubber ring on sheep used in castrating and docking

   E. Wether - Castrated male sheep

   F. Tags - Manure that collects in wool and forms balls, lowers the wool quality

   G. Fleece - The total wool from one sheep

   H. Mohair - Long fleece covering of the Angora Goat

   I. Shearing - Removing the fleece of wool by hand shears or power clippers

   J. Staple length - The length of the wool fibers

   K. Range-Band - The production of sheep in large range areas with a full-time overseer

   L. Ringing - The shearing of a circle of wool from around the pizzle of male sheep

II. Methods of Sheep Production

   A. The farm flock method

      1. Makes use of farm land not suitable for general farming

      2. Its often considered a minor enterprize

      3. Most common system of sheep production in the central, southern and eastern United States

INFORMATION SHEET

B. The purebred flock method

  1. Highly specialized and requires excellent management

  2. Most purebred flocks are comparatively small

C. The range-band method (sheep herding)

  1. Takes in 75% of United States sheep

  2. Primarily in the south western U.S.

  3. A full time herder is employed

  4. Vary in size from 800-3500 head

  5. Places much responsibility upon the herder

  6. Most sheep in this division are herded on fenced range

D. Feeding lambs

  1. Feed-lot fattening of purchased feeders

  2. Field fattening

    a. Winter wheat

    b. Scavenging harvested grain fields

  3. Custom feeding

III. Production Goals of the Four Sheep Production Systems

A. Farm flock

  1. Produce a mutton type market lamb, fat or feeder

  2. Provide supplemental income from sales of lambs and wool

B. Purebred production

  1. Sale of quality purebred rams and replacement ewes

  2. Maintain progress in production of genetically superior stock

INFORMATION SHEET

3. Maintain a reputation for producing quality sheep through successful showing of sheep

C. Range-Band

1. Production of quality feeder or fat lambs

2. The maximum production of quality wool

3. Make best use of available range land

D. Lamb feeding

1. The achieving of maximum gain on a minimum of feed

2. To produce a high quality meat type animal of slaughter weight with sufficient degrees of finish

IV. Factors Favorable to Sheep Production

A. Grazing characteristics of sheep

1. Can make maximum utilization of grazing conditions

2. In farm flock regions they can utilize land that would otherwise be wasted

B. Two products are produced

1. Lamb or mutton

2. Wool

C. Rapid rate of return on investment

1. Lambs may be marketed at eight (8) months after breeding of ewes

D. Wool is gaining in value in today's economy

1. Synthetic fibers are rising in cost

2. Demand for apparel wool is increasing

V. Current Trends that have a Negative Effect on the U.S. Sheep Industry

A. Total U.S. wool consumption is decreasing

1. Continuation of a long term trend

INFORMATION SHEET

   2. Primarily a result of the use of artificial fibers in the carpet industry

  B. Lamb and mutton consumption is down

  C. U.S.D.A. wool price supports are victim to competing government policies

VI. Management Skills Required of a Sheep Producer

  A. Castrating young rams - methods (TM 1)

   1. "Burdizzo"

   2. Knife

   3. Elastrator

  B. The docking of tails

   1. Dock before 14 days of age

   2. Results in a lamb cleaner around the tail

   3. Docked ewes settle easier

   4. Docked animals are more valuable to the packer

  C. Methods of docking tails (TM 1)

   1. Knife

   2. Elastrator

   3. Heated chisel or pincher

   4. "Burdizzo"

  D. Marking for identification

   1. Permanent

    a. Ear tags

    b. Fluid branding - use recommended material, removed when shorn

    c. tattoo

INFORMATION SHEET

2. Temporary
    a. Chalk
    b. Crayon

E. Shearing sheep
    1. Time of shearing usually determined by local climate
    2. Sheep are shorn:
        a. Annually in the north
        b. Bi-annually in the south
    3. Most shearing is done by professionals
    4. Ewes and lambs should be tagged prior to shearing to prevent manure from being included in the fleece

F. Parasite control
    1. Internal parasite control
        a. Drenching
        b. Oral boluses
    2. External control
        a. Spraying
        b. Dipping
        c. Tagging

G. Catching and restraining sheep (See TM 3)
    1. Confine sheep in a small area
    2. Grasp sheep firmly at base of neck
    3. Do not pull on wool
    4. Roll sheep on back with head up

INFORMATION SHEET

VII. Fleece Handling

- A. Keep wool clean and dry
- B. Remove tags
- C. Package fleece properly
    - 1. Keep fleece unbroken
    - 2. Roll correctly - outside out, neck and sides folded in, rolled from britch to neck
    - 3. Use paper twine only
    - 4. Pack in regulation bags
- D. Always handle the sheep carefully

VIII. Goat Production in the United States

- A. Dairy goats - milk
    - 1. Have shown a renewed interest among Americans
    - 2. Lactating goats are relatively easy to maintain
    - 3. One doe (female goat) will produce two-four quarts of milk per day
- B. Goats for Mohair production
    - 1. The Angora goat is the most significant breed in mohair production
    - 2. Mohair is valued for its weaving characteristics and durability
    - 3. Texas represents 90% of the nation's goat production

IX. Management of Dairy Goats

- A. Milk in clean quarters away from bucks to prevent odors or unpleasant taste of milk
- B. Lactating goats need some grain for maximum production
- C. Milk does at regular times

INFORMATION SHEET

X. Considerations For Starting in the Sheep Business
  A. Purchase stock from a reputable dealer
    1. Your county agent can buy for you on the state ewe/lamb procurement program
    2. Beware of older ewes - no teeth (see units on selection for aging)
  B. Start small
    1. Sheep are relatively labor intensive
    2. Time is required to gain experience at sheep management skills
    3. Herd can be expanded as facilities and management skills improve
  C. Necessary contacts when starting
    1. Locate the nearest sheep shearers
    2. Find an established farmer who is willing to offer advice

XI. Selecting a Sheep Production System
  A. Evaluate present enterprize
    1. Land - deciding factor between systems
    2. Labor
    3. Capital
    4. Management
  B. Know the requirements of various systems
    1. Range-band
      a. Experienced herder
      b. Large acreages of grazing land
    2. Farmflock
      a. Sufficient grazing land
      b. Other source of income

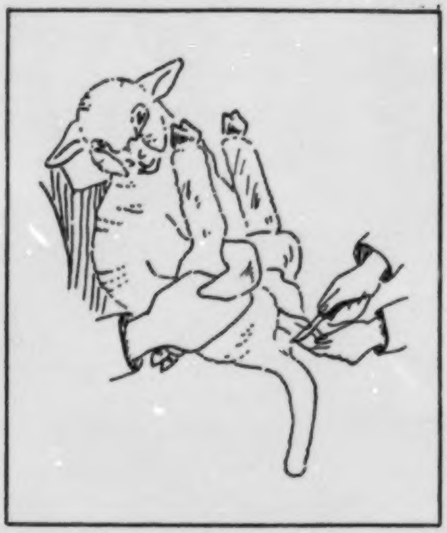
INFORMATION SHEET

3. Purebred
    a. Experience with purebred animals
    b. Labor and management available
    c. Good quality grazing land
4. Lamb feeding
    a. Facilities for dry lot feeding
    b. Feed - gains and roughage
    c. Ready market for fat lambs
    d. Feedlot management experience
    e. Moderate financial risk involved

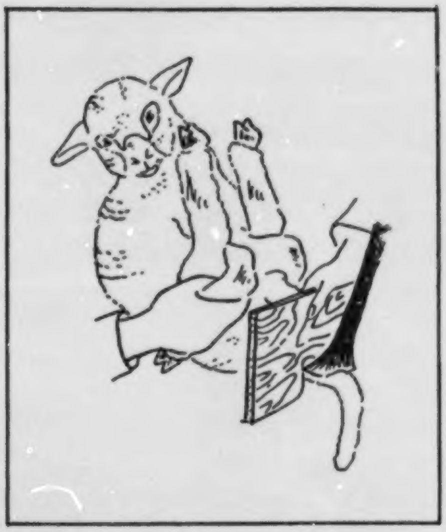
C. Compare and match enterprize evaluation with individual system requirements
    1. Determine best land use
    2. Determine labor allocation
    3. Project cashflow
    4. Select best compatible system

SB U2-12

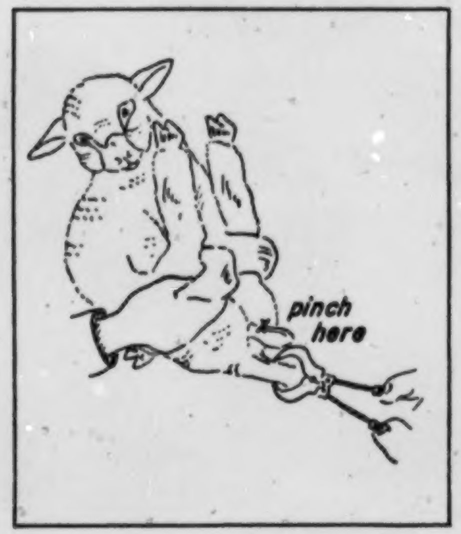
METHODS OF DOCKING AND CASTRATING LAMBS



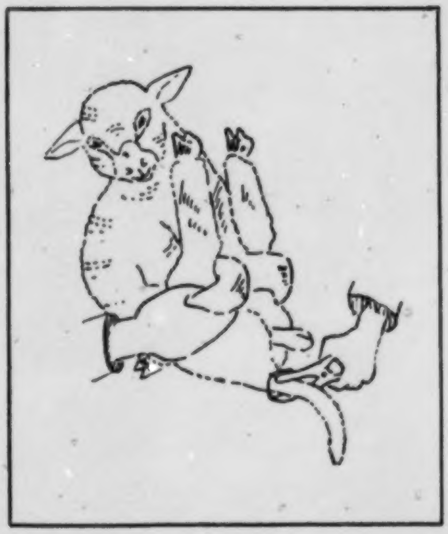
Knife
cut scrotum off



Hot Chisel or
Hot Pincher



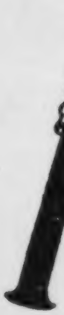
Burdizzo



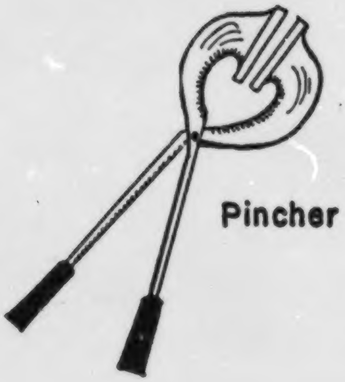
Elastrator
(place band on scrotum
in same manner)

TM 1

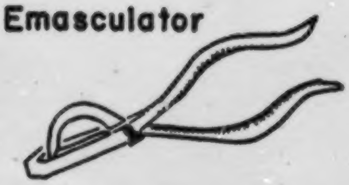
SHEEP DOCKING AND CASTRATING EQUIPMENT



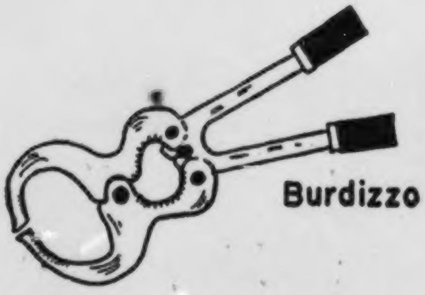
Chisel (burlap)



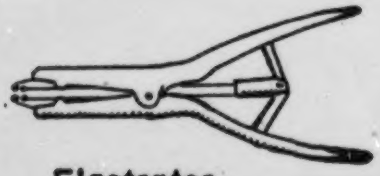
Pincher



Emasculator



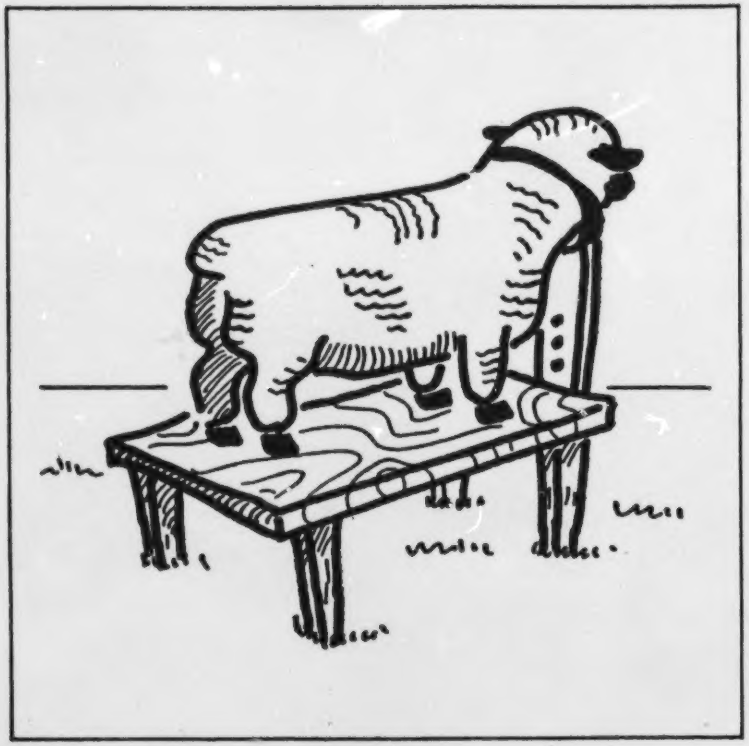
Burdizzo



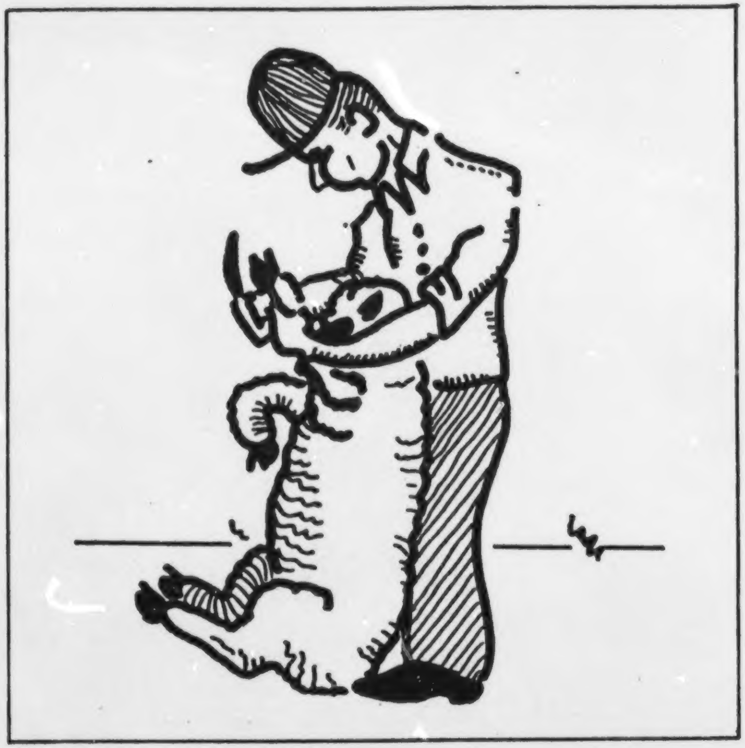
Elastrator

Knife

CATCHING AND RESTRAINING SHEEP



Sheep on a Trimming Stand



Manual Restraint of Sheep

TM 3

SB U2-14

LIVESTOCK PROGRAMS

UNIT II

ASSIGNMENT SHEET #1: Selection and Justification of a Sheep Production System for your farm

Perform specific objective eight (#10) by selecting and justifying a sheep production enterprize most compatible to your estimated farm situation.

LIVESTOCK PROGRAMS

UNIT II

TEST

1. Match the following terms below with their appropriate definition on the right.

_____ a. Tagging

_____ b. Mohair

_____ c. Fleece

_____ d. Docking

_____ e. Elastrator

_____ f. Range-Band

1. The wool from one sheep

2. Instrument for placing a special rubber ring on sheep for castrating and docking

3. The removing of dung locks from sheep

4. Method of producing sheep on open land

5. The removing of sheep tails early in life

6. The long fleece of the Angora goat

2. List the four methods of sheep production.

a.

b.

c.

d.

3. Write two goals for each sheep production method.

a. 1.

2.

b. 1.

2.

c. 1.

2.

d. 1.

2.

TEST

4. Identify four favorable factors of sheep production from the list below by placing an "X" in the corresponding blank.

_____a. Mutton consumption is up.

_____b. Sheep produce two products.

_____c. Rapid return on investment.

_____d. The milk is a delicacy.

_____e. Wool is increasing in value.

_____f. Low labor requirement.

_____g. Can make use of marginal grazing land.

_____h. No land is required.

5. List three current trends that negatively affect the U.S. sheep industry.

a.

b.

c.

6. Identify, by circling, the listed management skills required of a sheep producer.

Castrating

Restrain animals

Detecting illness

Dock tails

Spraying

Tagging

Drench or "Pill" sheep

Tattooing

Tying wool

7. Mark true or false the following statements referring to proper wool handling.

T F a. Wash wool with water after shearing.

T F b. Use paper twine only when tying wool.

T F c. Remove tags prior to shearing.

T F d. Pack all wool in the same sack.

TEST

8. List the two purposes of goat production in the U.S.

   a.

   b.

9. List three management practices for goat production

   a.

   b.

   c.

10. List the three requirements for starting in the sheep business.

    a.

    b.

    c.

LIVESTOCK PROGRAMS

UNIT II

ANSWERS TO TEST

1. a. 3 d. 5
   b. 6 e. 2
   c. 1 f. 4

2. a. Range-band
   b. Farm flock
   c. Purebred
   d. Lamb feeding

3. a. Farm flock:
      1. Produce market lambs, fat or feeder
      2. Provide supplemental income from sales of lambs and wool.
   b. Purebred production:
      1. Sell quality purebred replacement stock
      2. Maintain genetic progress
   c. Range-band: (any two)
      1. Produce quality feeder lambs
      2. Produce a maximum of quality wool
      3. Make best use of range
   d. Lamb feeding:
      1. Achieve maximum and most efficient rate of gain.
      2. Produce a high quality meat type lamb.

4. Those that should be marked are:
   b. c. e. g.

5. a. Total U.S. wool consumption is decreasing.
   b. Lamb and mutton consumption is down.
   c. U.S.D.A. wool price supports are victim to competing government policies.

ANSWERS TO TEST

6. All should be circled.

7. a. F c. T
   b. T d. F

8. Milk, Mohair.

9. a. Milk in clean quarters away from bucks
   b. Lactating goats need some grain for maximum production
   c. Milk does at regular times

10. a. Purchase stock from a reputable dealer
    b. Start small
    c. Make contacts when starting

11. Complete to the satisfaction of the instructor.

LIVESTOCK PROGRAMS

UNIT III

BEEF PRODUCTION SYSTEMS

TERMINAL OBJECTIVE

Upon completion of this unit, the student will be aware of all domestic beef production systems, know their particular characteristics and resource requirements, and be able to evaluate the system best adapted to his/her farm or ranch operation.

SPECIFIC OBJECTIVES

After completion of this unit, students will be able to:

1. Match terms relating to the various beef production enterprizes with their definitions.
2. Select from a list those beef production enterprizes that exist in your area.
3. Mark true or false, five statements referring to area situations that are conducive to beef production.
4. Discuss the three different commercial cow-calf production systems comparing the resources required of each.
5. Choose from a list, those management skills unique to purebred beef producers.
6. List four goals or concerns of a stocker program manager.
7. Compare advantages and disadvantages of dry-lot versus pasture beef production.
8. Identify those management skills implemented by a beef producer.
9. Answer questions covering the shipping and subsequent marketing of beef cattle.
10. Choose between commercial and on farm finishing of beef cattle. Give specific reasons for your decision.
11. Develop a beef production system suitable to your area and current farm or ranch operation. (Assignment Sheet #1).

LIVESTOCK PROGRAMS

UNIT III

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheets
2. Provide students with Information and Assignment Sheets
3. Make transparencies
4. Discuss Terminal and Specific Objectives
5. Plan field trip to local cattle enterprizes exhibiting various beef programs
6. Discuss Information and Assignment Sheets
7. Give Test

Students:

1. Read Objectives
2. Study Information Sheets
3. Participate in discussion
4. Participate in field trip
5. Complete Assignment Sheet
6. Take Test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information Sheets
3. Transparency Masters

   TM 1 - COW - CALF

   TM 2 - BACK-GROUNDING

INSTRUCTIONAL MATERIALS

TM 3 - BRUISES ON CATTLE

TM 4 - SHRINKAGE AND TRANSIT TIME

4. Assignment Sheet

   #1 - Developing a Beef Production System

5. Test

6. Answers to Test

References:

1. Ensminger, M.E., The Stockman's Handbook. 1978. Fifth Ed. Interstate Publishers, Danville, Ill.
2. Juergenson, Elwood M. Approved Practices in Beef Cattle Production, Fourth Edition, 1974. Interstate Publishers, Danville, Ill.
3. Neuman, A.L. Beef Cattle. Seventh Edition. 1977. John Wiley and Sons, New York.
4. Kansas Cow-Calf Handbook, Cooperative Extension Service, Kansas State University, Manhattan, Kansas.
5. Kansas Farm Management Handbook, Cooperative Extension Service, Kansas State University, Manhattan, Kansas.
6. Kansas Cattle Feeders Handbook, Cooperative Extension Service, Kansas State University, Manhattan, Kansas.
7. Doane's Farm Management Guide, St. Louis: Doane Agricultural Service, Inc., 1980.

Additional Materials:

1. Cow Herd Nutrition, Extension Circular, C - 582, Cooperative Extension Service, Manhattan, Kansas. 1977.

LIVESTOCK PROGRAMS

UNIT III

INFORMATION SHEET

I. Terms and Definitions

   A. Rangeland - Land areas not suitable for tillage and utilized primarily through grazing

   B. Commercial Beef Herd - A cow herd maintained solely for the production of beef calves for sale on the open market (also called cow-calf)

   C. Dry-lot - The production of beef in confinement

   D. Purebred herd - A cattle herd maintained as registered purebred animals for the production of breeding animals, primarily bulls and bred heifers

   E. Stocker calf - A young animal that is managed in a way that promotes growth rather than improved condition

   F. Feeder calf - A partially grown calf showing more finish than a stocker

   G. Back grounding - A specialized stocker program operated to prepare cattle for the feedlot

   H. Feedlot - Confinement feeding of cattle with higher concentrate rations to produce finished or fat cattle

   I. Shrink - Weight loss from tissue or excretory loss

II. Beef Enterprizes

   A. Commercial cow-calf herd

      1. Produce calves for sale

      2. Exists in most areas of U.S.

      3. Are of various sizes

         a. Farm herds 20-200 cows

         b. Ranch herds 50-500 cows - western areas

         c. Large range herds - 1000 cows or more predominantly exist on western range areas

INFORMATION SHEET

4. May be included with a finish or stocker operation also

5. May be sustained on permanent pastures, range or dry-lot

B. Purebred programs

1. Exist all over the country

2. Usually maintain a high visibility for advertising

3. Represent a large investment in seed stock

4. Often provide sires for the breeding of grade cows (non-purebred)

C. Stocker programs

1. Types of stocker cattle

a. Heifers intended as replacement cows

b. Steers and heifers intended for feeding-out

2. May be purchased at any time

a. Purchased as calves to be grazed

b. Bought to utilize crop residues

c. Purchased for incorporation into a feeding program and "backgrounded"

D. The finishing programs

1. Usually are located in grain producing areas

a. The great plains

b. Corn-belt

c. The North-West

d. The South

2. Program types

a. Farmer feeder - Feeding home-grown and/or purchased animals

b. Large feeder-feeding purchased animals

INFORMATION SHEET

- c. Commercial feed-lot
- 3. Degree of specialization
    - a. Can be the sole enterprize
    - b. May be incorporated with a stocker or total operation
    - c. Easily adapts to mechanization

III. Characteristics of Cattle Producing Areas

- A. Range and ranch areas - south west
    - 1. Well adapted to cattle production
    - 2. Operations that exist
        - a. Cow-calf - commercial and purebred
        - b. Stocker
    - 3. Primary feed available
        - a. Home grown grass and hay
        - b. Transported grain
- B. Combination farm operation areas
    - 1. Middle west, south and east
    - 2. Well adapted to all phazes of beef production
    - 3. Feed available - home grown
        - a. Grain
        - b. Grass & hay
        - c. Various forages
- C. Grain cropping areas
    - 1. Marginally adapted to beef production
    - 2. Feed available - home grown
        - a. Grain
        - b. Crop residues
        - c. Whole plant forages

INFORMATION SHEET

3. High land values restrict developing land as pastures.
4. Dry-lot beef production exists
    a. Cow-calf
    b. Finishing

D. Marketing situation needed
    1. Good market routes
        a. More than one outlet
        b. Good year-round demand
    2. Demand for surplus feed supplies
    3. Good source of replacement animals
        a. Bulls
        b. Replacement heifers
        c. Stockers and feeders
    4. Reliable local markets

IV. Resources and Management Skills Required of Three cow-calf Programs
    A. Dry lot cow-calf
        1. Requires all feed to be handled
            a. Adequate bunk space is required
            b. Ration can be monitored
            c. Equipment costs are relatively high
        2. Land
            a. Cattle can be confined to a few acres
            b. Other land is available for crop production
            c. Land may be needed for feed production
        3. Facilities needed
            a. Feeding equipment - storage and handling
            b. Lot cleaning equipment

INFORMATION SHEET

- c. 355 $ft.^2$ lot space per cow and calf
- d. Facilities represent a high capital outlay

4. Labor requirements
   - a. Higher than pasture systems, 10-20 hr/cow/year
   - b. Cattle must be fed every day
   - c. More labor is required in calf health management
   - d. Higher skilled labor is required than for comparable systems
5. Special management skills required
   - a. Detect calf health problems
   - b. The maintenance of balanced rations

B. Pasture cow-calf (TM 1)

1. Land
   - a. Sufficient pasture is needed to sustain cattle
   - b. In northern climates hay must be grown on other land for winter feeding
2. Feed needed
   - a. Hay for wintering the animals
   - b. Supplements to hay and grass
   - c. Grain for creep feeding
3. Facilities and equipment
   - a. Fences
   - b. Permanentor portable handling equipment
   - c. Supplement feeders
4. Labor
   - a. High-quality labor is needed
   - b. 5-14 hours per cow per year

INFORMATION SHEET

- c. Higher during the winter and calving

C. Cow-calf on the range

- 1. Land
    - a. Sufficient grass is needed to sustain all cows - tall grass 10-15 acres per cow, short grass 20-30 acres per cow
    - b. Land may be needed to grow winter feed
- 2. Facilities needed
    - a. Fences
    - b. Cattle handling equipment-corrals
    - c. Cattle moving equipment
    - d. Year-round water supply
    - e. Winter shelter if in northern climates
- 3. Labor requirements
    - a. Similar to pasture systems
    - b. More seasonal
- 4. Special management skills required
    - a. Branding and animal identification
    - b. Upkeep of native grasslands
    - c. Control and efficient use of large acreages
    - d. Labor management involving hired herdsmen

V. Purebred Cattle Production

A. Requirements for success

- 1. Keen business judgement and honesty
- 2. Skill in choosing herd replacements

INFORMATION SHEET

3. Good capital base

4. Dedication to a long-term role as a cattle improvement enterprize

B. Purebred enterprizes

1. Master breeder

2. Purebred breeder

3. Large operator two herds - one commercial, one purebred

4. 4-H and FFA projects

C. Special management skills needed of the purebred breeder

1. Selection for genetic improvement

2. Advertising skills, public-relations

3. Fitting of show animals

a. Feeding

b. Grooming

c. Showmanship

D. Financial Aspects

1. Capital is tied up in a relatively small number of animals

2. The sale price of these animals is highly variable
2.5 x market value - up

3. Returns can be slow

VI. Managing the Stocker Program

A. Enterprizes

1. Purchased in fall - wintered - sold in spring

2. Purchased in fall - wintered - grazed in summer - sold in fall

3. Winter grazing on small grains

INFORMATION SHEET

4. Combination stocker-feeder
    a. Grazed on fall pasture
    b. Wintered on silage in the feed-lot

B. Goals of a stocker program manager
    1. Produce low cost rate-of-gain
    2. Utilize cheap roughages
    3. Keep over-head low
    4. Keep close watch on market trends
    5. Use minimum labor per pound of gain

C. Negative aspects
    1. Above average market risk as gains are small and may not cover a strong downward movement
    2. Much capital is needed to buy calves
    3. The chance for financial loss is high, it is not always profitable

VII. Advantages and Disadvantages of Dry-Lot and Pasture Beef Production

A. Advantages of dry-lot
    1. Ration formulation can be closely controlled
    2. Higher rates of gain are realized in older cattle versus pasture
    3. Packers prefer dry-lot fed over pasture-fed beef
    4. Cattle can be observed more easily

B. Disadvantages of dry-lot
    1. More feeding equipment is needed
    2. Higher labor is a factor
    3. Feed-lot facilities are required
    4. More capital investment is necessary

INFORMATION SHEET

C. Advantages of pasture

  1. Harvesting equipment and time is avoided
  2. Yearlings seem to do better on pasture
  3. Marginal farm land can be utilized
  4. Capital outlay (excluding land) is usually lower

D. Disadvantages of pasture

  1. Cattle are often not watched as closely
  2. Is usually available in the summer only
  3. Tillable pasture land may yield a higher income if cropped
  4. Feed volume is more dependent on the weather

VIII. The Management Skills of a Beef Producer

A. General business skills

  1. Financial management
  2. Labor management
  3. Time management
  4. Purchasing and marketing management
  5. Maintain production efficiency
  6. New research awareness

B. Manual skills and practices

  1. Identification
     a. Ear tagging
     b. Branding - hot & cold
     c. Tattooing
     d. Ear notching
     e. Neck chain

INFORMATION SHEET

2. Health related skills
    a. Established disease prevention program
    b. Proper nutrition
    c. Parasite control
3. Dehorning
    a. Increases market value
    b. Desirable in many ways
    c. Can be done in a variety of ways
4. Castrating
    a. Done primarily for economic reasons
    b. Knife castration
    c. Bloodless castration

IX. Shipping and Marketing Concerns

A. Losses sustained during shipment

1. Injury in transit
    a. Crippling - 3 in 5,000 animals
    b. Bruises - 24% of all cattle (TM 3)
    c. Death - 1 in 5,000 animals
2. Shrinkage
    a. Excretory shrink - first 12 hr.
    b. Tissue shrink - after 12 hr.

INFORMATION SHEET

B. Lowering shrinkage losses (TM 4)

1. Shorten transport time

Table 1

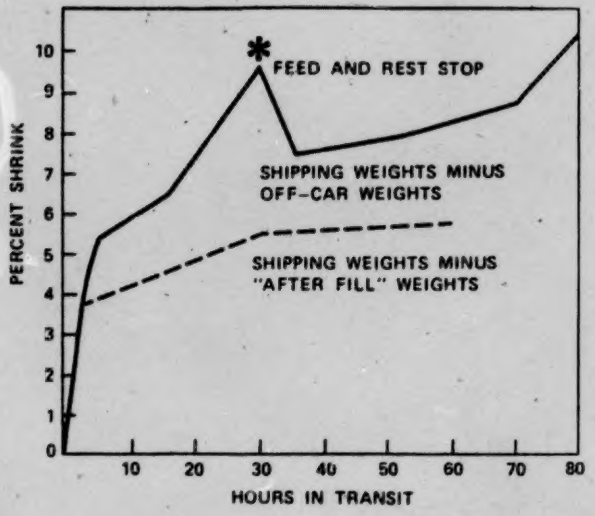


Figure 1. Shrinkage increases as hours in transit increase (fat cattle).

2. Lower stress during transit

   a. Don't over or underload

   b. Avoid extreme weather conditions

   c. Have a rest stop on the "long haul"

3. Convert to a non laxative feed before shipping

   a. Grass hay

   b. Concentrates (dry)

   c. Do not overfill

4. Be aware of the handling conditions

INFORMATION SHEET

Table 2

Shrinkage Loss Due to Different Handling Conditions

Conditions	Percent Shrink
8-hour drylot stand	3.3
16-hour drylot stand	6.2
24-hour drylot stand	6.6
8-hours in moving truck	5.5
16-hours in moving truck	7.9
24-hours in moving truck	8.9

C. Costs of Transport and Marketing

1. Pencil Shrink
    - a. Usually 2-3% - 12 hr.
    - b. May exaggerate local cattle
    - c. Overnight stand 4-5%
2. Freight
    - a. Usually 1/2 of marketing cost
    - b. A function of: total weight - number of head - distance
3. Yardage
    - a. Handling
    - b. Pen rent and facilities
4. Insurance - transport
5. Feed (not all cases)
6. Commission
    - a. Order buyer commission - to buyer
    - b. Sales commission - to seller

INFORMATION SHEET

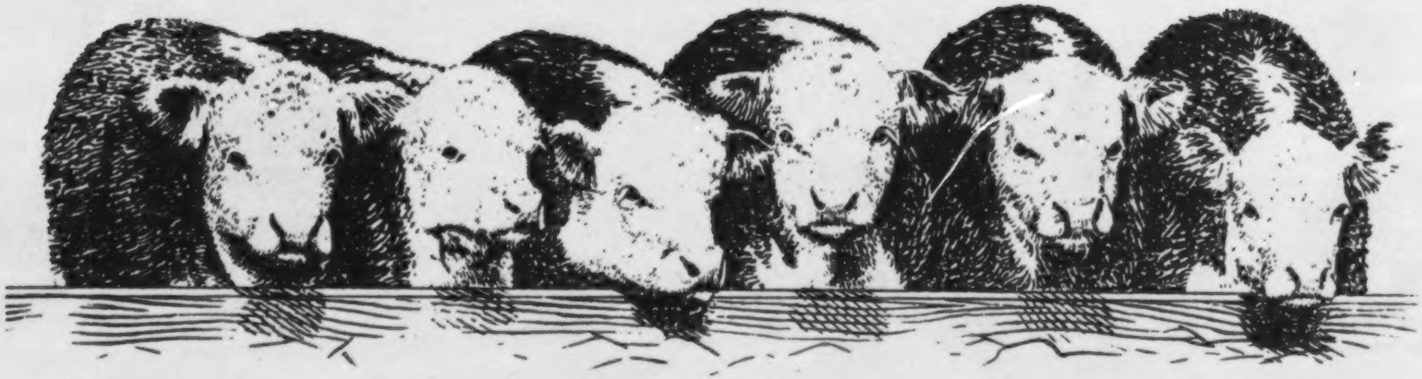
7. National Livestock and Meat Board - "Check-off"
    a. $ 0.25 per head
    b. Used for beef promotion

X. On Farm and Commercial Cattle Feeding
  A. Advantages of on-farm feeding
    1. "Home-grown" feed can be marketed through cattle
    2. High moisture "home-grown" grain can be used
    3. Cattle need only to be transported once
    4. Cattle will not have to adapt to new surroundings
    5. Your own labor can be used
    6. Manure stays on the farm
  B. Advantages of commercial feeding
    1. Feeds are formulated by professionals
    2. Better feed processing methods may be used than on the farm
    3. Home labor can be used for other purposes
    4. Custom feed lots often offer professional marketing services

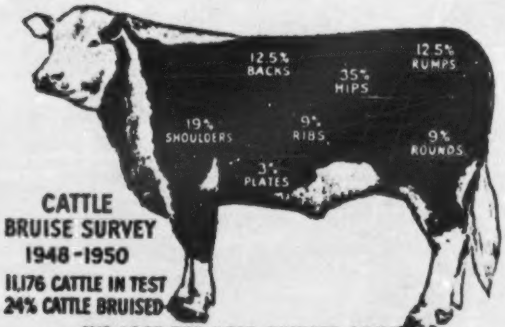
COW - CALF

SB U3-17

BACKGROUNDING

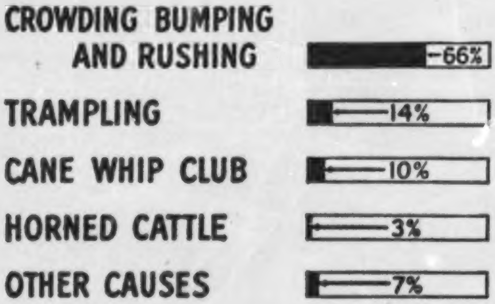


LOCATION OF CATTLE BRUISES

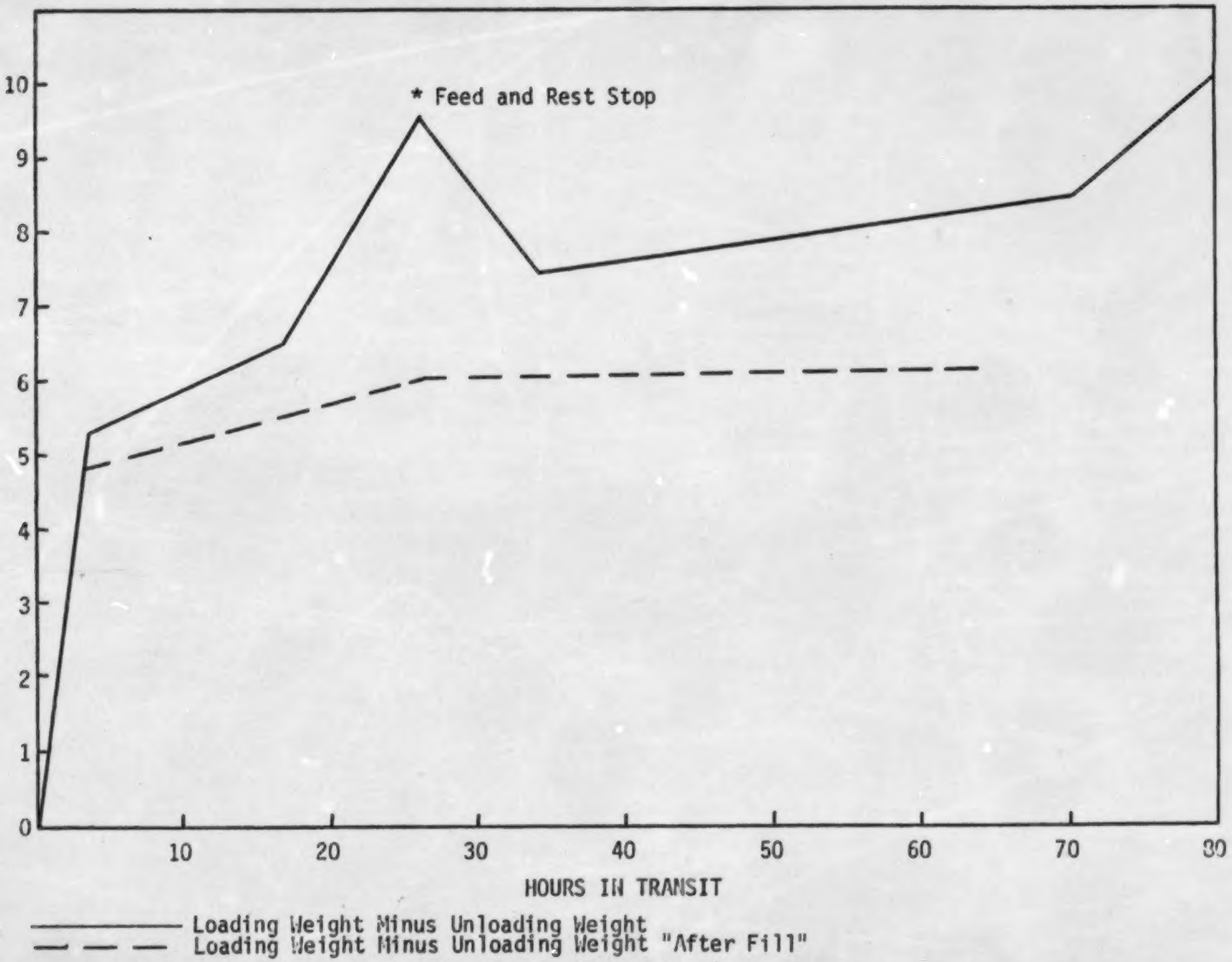


CATTLE
BRUISE SURVEY
1948-1950
11,176 CATTLE IN TEST
24% CATTLE BRUISED
AVG. LOSS PER HEAD BRUISED $6.76
BRUISE LOSS PER HEAD SLAUGHTERED $1.62

CAUSES OF CATTLE BRUISES



SHRINKAGE AND TRANSIT TIME



LIVESTOCK PROGRAMS

UNIT III

ASSIGNMENT SHEET #1: Developing a Beef Production System

In fulfilment of objective #10, outline and explain a beef production system adapted to your farm. Justify your conclusions. Choose any of the programs presented.

LIVESTOCK PROGRAMS

UNIT III

TEST

1. Match the following terms below with their appropriate definition on the right.

_____a. Stocker calf

_____b. Dry lot

_____c. Feeder calf

_____d. Back-Ground

_____e. Feed-lot

_____f. Shrink

_____g. Purebred herd

_____h. Rangeland

_____i. Commercial Beef Herd

1. Cows maintained for the production of calves for sale for beef
2. Cows maintained for the production of breeding stock
3. Partially grown calf in good condition
4. Calf showing little finish
5. Production of beef in confinement
6. To prepare cattle for the feed lot
7. Specialized confinement beef feeding
8. Weight loss during shipping
9. Land suitable for grazing only

2. Select those beef enterprizes that exist in your area, and place a check by them.

_____a. Farmer feeder

_____b. Custom feeder

_____c. Cow-calf - on pasture

_____d. Cow-calf - drylot

_____e. Purebred

_____f. Large feeder

_____g. Stocker - winter graze

_____h. Backgrounding

3. Mark the following statement true or false by circling the appropriate letter.

T F a. Top quality crop land is more profitable as pasture.

T F b. Range land is not suitable to cow-calf operations.

T F c. Good quality roughage must be available for most beef programs.

TEST

T F d. Farms with both tillable and pasture land are excellent for cattle production.

T F e. Availability of markets is of little or no importance to the cow-calf - stocker operator.

4. Discuss the three commercial cow-calf production systems, comparing the resource requirements of each.

5. Choose from the list below those management skills unique to purebred breeders, and place an "x" by them.

_____a. Keen business judgement

_____b. Honesty

_____c. Fitting show animals

_____d. Advertising

_____e. Genetic management

_____f. Feeding

_____g. Health management

_____h. Clipping

6. List four goals or concerns of a stocker feeder.

a.

b.

c.

d.

7. Compare advantages and disadvantages of dry-lot versus pasture beef production.

TEST

8. Identify by a check which of the following skills are required of a beef producer.

_____a. Labor and time management.

_____b. Marketing management.

_____c. Branding

_____d. Dehorning

_____e. Shoeing

_____f. Figuring "break even".

_____g. Detecting illness.

_____h. Trimming teeth.

9. Answer the following by circling the correct answer:

   1. Handling cattle gently during shipping will _______

      a. Reduce shrinkage.

      b. Reduce carcus brusing.

      c. Lower stress.

      d. All of the above.

   2. Shrinkage can be reduced most by __________

      a. Watering heavily before transit.

      b. Watering heavily after transit.

      c. Shortening the time between loading for transport and weighing.

      d. All of the above.

   3. The most common injury occurring in transit is ______

      a. Broken legs.

      b. Severe injury and death.

      c. Bruises.

      d. None of the above.

TEST

4. Which of the following are not costs sustained by the marketer?

   a. Sale commission.

   b. Shrinkage.

   c. Freight to the buyer.

   d. Yardage.

10. Choose between on-farm and commercial feeding of your cattle. Give specific reasons for your decision.

LIVESTOCK PROGRAMS

UNIT III

ANSWERS TO TEST

1. a. 4
   b. 5
   c. 3
   d. 6
   e. 7
   f. 8
   g. 2
   h. 9
   i. 1

2. Answered to the satisfaction of the instructor.

3. a. F
   b. F
   c. T
   d. T
   e. F

4. Compare labor and financial requirements.

5. d.

6. Any four of the following:
   1. Economical gain
   2. Market movements
   3. Low overhead
   4. Use cheap roughages
   5. Use minimum labor

7. Mention:
   a. Equipment requirements
   b. Labor
   c. Degree of finish
   d. Capital requirements
   e. Ration control
   f. Utilization of pasture

8. All should be checked except d. and h.

ANSWERS TO TEST

9. 1. d
   2. c
   3. c
   4. c

10. Answered to the satisfaction of the instructor.

LIVESTOCK PROGRAMS

UNIT IV

DAIRY PROGRAMS

TERMINAL OBJECTIVE

Upon completion of this unit, students will have a good understanding of what is included in a dairy operation, what is expected of a dairy manager and the products derived from milk. This objective will be considered achieved by scoring at least eighty-five percent on the test.

SPECIFIC OBJECTIVES

After completion of this unit, students will be able to:

1. Match dairy related terms with their definitions.
2. Discuss three important aspects of dairying in the United States.
3. List in order and give the approximate percentage content of the components of fresh milk.
4. Tell the consumption trends of six (6) dairy products.
5. Identify four types (4) of dairy producers and give an identifying characteristic of each.
6. Match dairy facilities with the region where they might most likely exist.
7. Give six resources needed for dairying.
8. List six of the eight major competencies of a successful dairy manager.
9. Discuss two favorable and two unfavorable factors of dairy production.
10. List four enterprizes contained within a complete farm business.
11. Outline, by order of event, proper milking procedure.
12. Outline the costs and returns for dairying today.

LIVESTOCK PROGRAMS

UNIT IV

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheet
2. Provide students with Information Sheets
3. Plan a tour of local dairy(ies)
4. Make transparencies
5. Discuss Terminal and Specific Objectives
6. Discuss Information Sheets
7. Take field trip
8. Give Test

Students:

1. Read Objectives
2. Study Information Sheets
3. Participate in discussion
4. Participate in field trip
5. Take Test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information Sheets
3. Transparency Masters

TM 1 - COMPOSITION OF MILK

TM 2 - CHANGE IN U.S. MILK USAGE

TM 3 - DAIRY PRODUCERS

TM 4 - MILKING MACHINE

INSTRUCTIONAL MATERIALS

4. Test

5. Answers to Test

References:

1. Bath, D.L. et al, Dairy Cattle: Principles, Practices, Problems, Profits, Second Edition. LEA & Febiger Publishers, Philadelphia, 1978.

2. Ensminger, M.E., Dairy Cattle Science, Second Edition, Interstate Publishing Company, Danville, Ill. 1980.

3. Ensminger, M.E., The Stockman's Handbook, Fifth edition, Interstate Publishing Company, Danville, Ill. 1978.

4. Kansas Farm Management Handbook, Cooperative Extension Service, Kansas State University, Manhattan, Kansas.

5. Handbook for Dairymen, Cooperative Extension Service, Kansas State University, Manhattan, Kansas. Circular 491.

LIVESTOCK PROGRAMS

UNIT IV

INFORMATION SHEET

I. Terms and Definitions

A. Dry Cow - A cow during her non-lactating period, usually the 60 days prior to calving

B. Replacement Heifer - A heifer calf to be added to the herd upon maturity

C. Butterfat - Fat fraction of milk

D. Ash - Mineral fraction of milk

E. Solids-Non-Fat - The solids of milk excluding butterfat

F. Lactose - The primary sugar in milk

G. Commercial Dairyman - A dairyman that milks grade (non-purebred) cows

H. Free-stall Barn - A dairy barn which allows random cow movement during the day

I. Stall-barn - A dairy barn where cows are secured in one stall during the day

J. Veal calves - Bull calves, or non-replacement heifers, that are fed to 200 lbs. and butchered

K. Mastitis - Inflamation of the udder; a prime concern of dairymen

L. Parlor - Milking facility separate from the cattle holding area

M. Yogurt - A cultured dairy product growing in popularity in the United States

N. Casein - The principle phospho-protein in milk

O. Grade "A" Milk - Milk suitable for use as fluid milk

P. Grade "B" Milk - Milk suitable for use in manufacturing only

Q. Lactate - To secreate milk

INFORMATION SHEET

II. The Importance of Dairying in the United States

  A. Farm commodity

    1. Ranks #2 among animal products
    2. Provides over $12 billion in income to U.S. farmers per year
    3. Meets a ready market - 552 lb./person/annum

  B. As a food source

    1. Is available to virtually all U.S. citizens
    2. Is essentially a uniform-standard quality food
    3. Yields an excellent food from non-edible inputs
    4. Provides a nearly balanced food in a convenient form
    5. Non fat dry milk is the cheapest source of dietary animal protein

  C. Provides a variety of edible products

    1. Fluid milk
    2. Cheeses
    3. Butter
    4. Yogurt
    5. Cream
    6. Ice-cream
    7. Dry milk

  D. Efficiency of nutrient conversion

    1. Protein conversion 25%
    2. Energy conversion 17%
    3. Second only to Hens (eggs)
      a. Protein - 26%
      b. Energy - 18%

INFORMATION SHEET

III. The Composition of Milk and Milk Products (TM 1)

- A. Water content of milk
  - 1. 87.2% of milk
  - 2. Low and high 82.4 - 90.7%
- B. Fat (milk fat)
  - 1. Average 3.7%
  - 2. Low and high 2.5 - 6.0%
- C. Solids - not fat
  - 1. Protein (80% casein)
    - a. Average 3.5%
    - b. Min. and max. 2.7 - 4.8%
  - 2. Lactose (milk sugar)
    - a. Average 4.9%
    - b. Min. and max. 3.5 - 6.0%
  - 3. Minerals (ash)
    - a. Average 0.7%
    - b. Min. and max. 0.6 - 0.8%
  - 4. Total solids - 9.3 - 17.6%
- D. Butterfat content of some milk products
  - 1. Butter - 80% fat
  - 2. Cheese - 30-40%
  - 3. Ice-cream - 10-18%
  - 4. Table cream - 18-20%
  - 5. Whole milk - 3.25 min.
  - 6. Whipping cream - 40%

INFORMATION SHEET

IV. Dairy Product Consumer Trends

- A. Milk production and use
  - 1. 80% of milk produced as Grade A and fit for use as fluid milk
  - 2. 20% produced as Grade B manufactors milk
  - 3. 40% of milk is consumed as fluid (milk and cream)
- B. Dairy product consumption
  - 1. Fluid milk and cream 40-45%
  - 2. Cheese 23.6%
  - 3. Butter(decreasing) 17.8%
  - 4. Ice cream 9.5%
  - 5. Dry and condensed 1.8%
  - 6. Other 5.7%
- C. Consumption trends of dairy products (TM 2)
  - 1. Overall consumption stable
  - 2. Fluid milk
    - a. Wholemilk - down
    - b. Low fat - up
  - 3. Cheeses - up
    - a. Snacks
    - b. Processed foods
  - 4. Yogurt - up, 400% last five years
  - 5. Ice-cream - stable
  - 6. Ice milk - up
  - 7. Butter - down

INFORMATION SHEET

V. Types of Dairy Producers (TM 3)

- A. Commercial producer
  - 1. 70% of all producers
  - 2. Maintains a herd of Grade or mixed cows
  - 3. Most replacement stock is purchased
  - 4. Income is from sale of milk
- B. The purebred dairyman
  - 1. Maintains a registered cow herd
  - 2. Supplements income with sale of registered stock
  - 3. 20% of all dairymen
- C. The purebred breeder
  - 1. Maintains a registered cow herd
  - 2. Primary income is from sale of breeding stock
  - 3. Sale of milk supplements income
  - 4. 10% of producers
- D. Dairy herd as a side line
  - 1. Usually supplements other farming enterprizes
  - 2. The trend 40 years ago
  - 3. Produce Grade "B" or manufacturing milk
- E. Production trends today
  - 1. Decline in number of dairy farms and herds
  - 2. Cow numbers decreasing
  - 3. Herd size and production per cow have increased
  - 4. Total milk production - slight decrease

INFORMATION SHEET

VI. Types of Dairy Facilities

  A. Two basic systems

    1. Loose cow housing with parlor milking

    2. Stall barn housing with in-stall milking

  B. Loose cow housing

    1. Open air lots - southern regions

    2. Open shed with free stalls - mid regions

    3. Feeding is usually done outside

    4. Milking is done in adjacent milking parlor

    5. Cows are free to move around

  C. Stall barn

    1. Middle regions unheated barns

    2. Northern regions closed "warm housing"

    3. Cows are milked in the stalls

    4. Cows are always accessible - advantageous to the purebred breeder

    5. Feeding is done inside

VII. Resources Required of Dairy Producers

  A. Feed

    1. Good forages

      a. Hay - 4.3 ton/head/yr.

      b. Silage - 5 ton/head/yr.

    2. Protein sources

      a. Alfalfa

      b. Commercial feeds 700 lb./head/yr.

INFORMATION SHEET

    3. Concentrates - corn 82 ba./head/year

- B. Labor
    1. Trained in dairy management
    2. Interest in dairy operations
    3. 100-125 annual hrs. per animal (no crop)
- C. Capital
    1. Knowledgeable banker
    2. Capital management
    3. 1500-2000 dollars per mature cow
- D. Strong local milk market
    1. Alternative markets
    2. Milk cooperatives in area
- E. Supporting services
    1. Competent Al service available
    2. Veterinarians in area
    3. Good service for equipment
        - a. Milking machines
        - b. Feeding equipment
        - c. Milk handling and storage equipment
- F. Management

VIII. Competencies Required of a Dairyman

- A. Record-keeping
    1. Breeding records
    2. Up-to-date animal identification records
    3. Analyzes and uses production records

INFORMATION SHEET

B. Milking skill

   1. Insist on and use correct milking procedures

   2. Maintain milking system in good condition

   3. Keep mastitus losses to a minimum

   4. Follow a regular milking routine

C. Herd health (see section SB)

   1. Follow an established herd health program

   2. Recognize animal health problems and know when to treat and/or seek assistance

   3. Keep herd health records

D. Feeding

   1. Utilize basic principles of nutrition for all animals

   2. Use technology needed to formulate the most profitable rations

E. Breeding

   1. Detect cows in heat and determine best time for breeding

   2. Plan and follow a constructive breeding program

   3. Select cows based on production and physical traits of economic importance

   4. Breed cows for a 12-month calving interval

F. Business management

   1. Maintain adequate and accurate farm enterprize records

   2. Obtain and use credit wisely

   3. Maintain a feel for how all of the farm works together

INFORMATION SHEET

G. Housing

1. Understand housing requirements, including space and ventilation needs

2. Have efficient methods for handling feed, manure and animals

H. Labor

1. Plan labor needs for peak and non-peak work loads

2. Use labor efficiently and recognize when hired labor would be profitable

IX. Favorable and Unfavorable Factors of Dairying

A. Factors favorable to dairy production

1. Dairying is a stable business

2. The dairy cow is an efficient food production

3. Steady income is ensured

4. Steady employment is provided for labor

5. Dairy cattle consume much unsaleable roughage

B. Factors unfavorable to dairy production

1. Considerable capital is required

    a. 1500-2000 dollars per milking cow

2. Dairy management requires superior training

3. Many Government Regulations apply

4. Dairying is confining

5. Hourly returns are low

6. The threat of imitation dairy products

X. The Enterprizes that Exist within a Dairy

A. Those that usually exist

1. The cow herd (health, nutrition and breeding)

INFORMATION SHEET

- 2. The raising of replacement heifers
- 3. Forage production and feed management
- 4. Management of milk and the milking process

B. Optional Enterprizes

- 1. Veal calf production
- 2. Growing and fattening steers and cull animals
- 3. Management and sale of registered animals

XI. The Procedure for Proper Milking

A. General considerations

- 1. Establish a routine
- 2. Keep the cows calm
- 3. Maintain equipment in top condition
- 4. Milk at regular intervals

B. Preparing and stimulating "milk let-down"

- 1. Wash udder and teats
- 2. Dry teats using a disposable paper towel
- 3. Remove 1 or 2 streams of milk into a strip cup or paddle for a mastitis test
    - a. This also cleans the teat canal
    - b. Helps to stimulate "let-down"

C. Attaching milking machine

- 1. Attach from one to one and a half minutes after wash
- 2. Machine strip only a few seconds
- 3. Milking should take from 3-6 minutes

INFORMATION SHEET

- D. Removing milking machine
    - 1. Remove promptly when milk flow stops
    - 2. Break vacuum first
    - 3. Prevent over-milking
- E. After milking
    - 1. Apply teat dip to cow's teats
    - 2. Record milk weights
    - 3. Thoroughly clean milking machine and lines
- F. Methods of milking (TM 4)
    - 1. Calf
    - 2. By hand
    - 3. Machine

XII. The Costs and Returns of Dairying Today

- A. Cash costs
    - 1. Purchased feed
    - 2. Labor - 60 hr. per cow x $4/hr.
    - 3. Marketing and breeding expenses
    - 4. All out-of-pocket expenses
    - 5. 60% of interest on working capital
- B. Annual costs
    - 1. Opportunity cost for all home produced resources
    - 2. 70% of interest on livestock and livestock facilities
    - 3. 40% of interest on working capital
- C. Fixed costs
    - 1. Depreciation

INFORMATION SHEET

2. Taxes and insurance

3. Interest on non livestock equipment

4. Breeding stock expenses (excluding purchase)

D. Returns

1. Milk sold

2. Calves sold

3. Cull cows sold

4. Surplus feed sold

TM 1

Composition of Milk

Constituent	*Average content*	*Normal variation*
	%	%
Water	87.2	82.4–90.7
Fat (milk fat)	3.7	2.5–6.0
Solids—not fat	9.1	6.8–11.6
Protein	3.5	2.7–4.8
Casein	2.8	2.3–4.0
Lactalbumins and lactoglobulins	0.7	0.4–0.8
Lactose (milk sugar)	4.9	3.5–6.0
Minerals	0.7	0.6–0.8
Total solids	12.8	9.3–17.6

TM 2

Change in U.S. milk usage

Item	Per capita sales[a]		Percent change
	1965	*1975*	
Fluid products			
Whole milk	264.0	195.0	− 26.1
Low fat milk[b]	34.0	84.7	+149.1
Cream[c]	7.6	5.9	− 26.1
	305.6	285.6	
Cheese			
American cheese	5.7	7.9	+ 38.6
Cottage cheese	4.7	5.0	+ 6.4
Other	3.4	6.2	+ 82.4
	13.8	19.1	
Spreads			
Butter	5.8	4.4	− 24.1
Margarine	9.9	11.5	+ 16.2
	15.7	15.9	
Frozen products			
Ice cream	18.8	18.8	0
Ice milk	6.6	7.6	+ 15.2
Sherbet	1.5	1.5	0
	26.9	27.9	
Other			
Evaporated and condensed milk	10.8	5.2	− 51.9
Nonfat dry milk	4.8	3.1	− 35.4
Yogurt	0.3	2.0	+566.7
	15.9	10.3	

[a] Based on civilian population except fluid milk products, which are based on estimated population using fluid products from purchased sources.

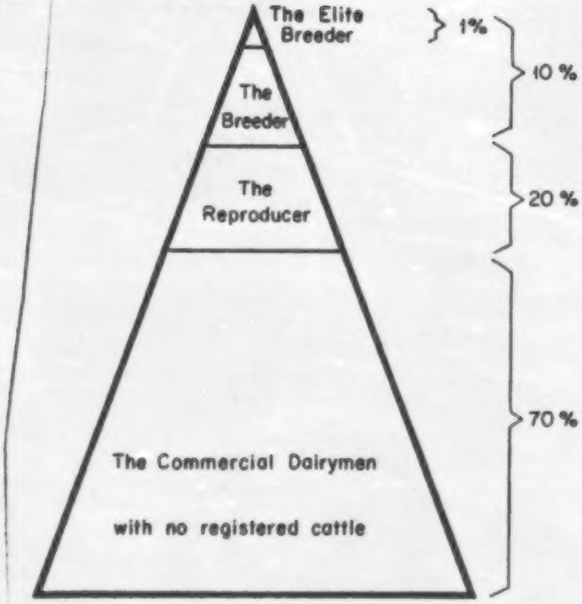
[b] Includes skim milk, buttermilk, and flavored milk drinks.

[c] Includes milk and cream mixture.

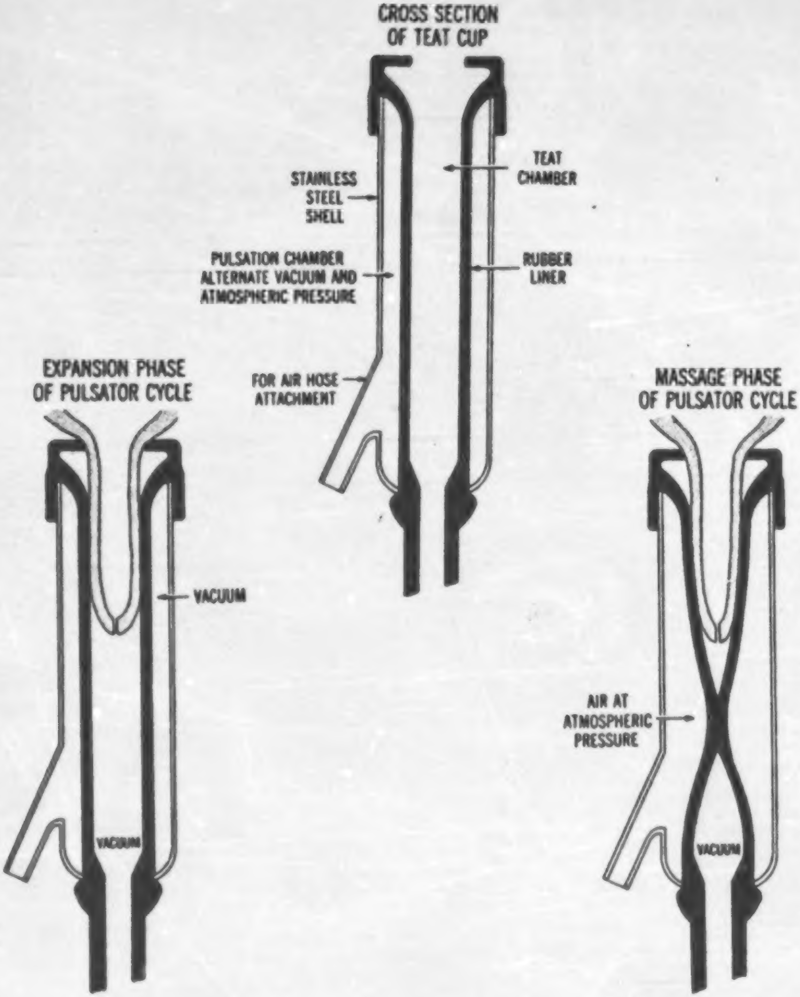
Source: Economic Research Service, USDA: *Dairy Situation*, DS-359, March, 1976; and DS-361, July, 1976.

IM 3

Dairy Producers



MILKING MACHINE


CROSS SECTION OF TEAT CUP
STAINLESS STEEL SHELL
PULSATION CHAMBER ALTERNATE VACUUM AND ATMOSPHERIC PRESSURE
FOR AIR HOSE ATTACHMENT
TEAT CHAMBER
RUBBER LINER
EXPANSION PHASE OF PULSATOR CYCLE
VACUUM
VACUUM
MASSAGE PHASE OF PULSATOR CYCLE
AIR AT ATMOSPHERIC PRESSURE
VACUUM

260

TML

LIVESTOCK PROGRAMS

UNIT IV

TEST

1. Match the terms below with their appropriate definition on the right.

_____a. Solids - nonfat

_____b. Veal calves

_____c. Casein

_____d. Mastitis

_____e. Butterfat

_____f. Dry cow

_____g. Milking parlor

_____h. Yogurt

_____i. Stall-barn

_____j. Lactate

1. A popular cultured dairy product
2. Non-milking cow
3. The primary milk protein
4. To secreate milk
5. Material in milk other than water or butterfat.
6. Cow shelter where cows are milked, where they stand all day.
7. Inflamation of the udder.
8. Calves fattened on milk and butchered.
9. The most variable component of milk.
10. Facility for milking cows independent of their shelter.

2. Discuss three important aspects of dairying in the United States.

a.

b.

c.

TEST

3. a. List in order and give the approximate percentage of the following components of milk.

Fat, Ash, Water, Protein, Lactose (milk sugar).

b. Also calculate:

1. Solids - nonfat (average)

2. Total solids

4. Tell the consumption trends of six common dairy products.

a.

b.

c.

d.

e.

f.

5. List the four types of dairy producers and give an identifying characteristic of each.

a.

b.

c.

d.

6. Match the listed dairy facilities with the state where they would most likely exist. (Answers may be used more than once).

_____a. Open lots with shade only

_____b. Open shed with free-stalls

_____c. Cold stall barn

_____d. Warm stall barn

1. Texas

2. Maine

3. Kansas

4. Wisc.

TEST

7. Give six resources needed for dairying.

a.

b.

c.

d.

e.

f.

8. List six of the eight competencies of a successful dairyman.

a.

b.

c.

d.

e.

f.

9. Discuss two favorable and two unfavorable factors of running a dairy.

10. List four separate enterprizes that usually exist within a dairy farm business.

a.

b.

c.

d.

11. Outline, in order of events, proper milking procedure.

a.

TEST

b.

c.

d.

12. Outline the costs and returns of dairying today.

    a. Costs.

    b. Returns.

LIVESTOCK PROGRAMS

UNIT IV

ANSWERS TO TEST

1. a. 5
   b. 8
   c. 3
   d. 7
   e. 9
   f. 2
   g. 10
   h. 1
   i. 6
   j. 4

2. Dicuss any three of the following to the satisfaction of the instructor:
   a. Production efficiency.
   b. Food quality or variety of foods.
   c. Income generation.
   d. Economical nutrient source.
   e. Demand for milk.

3. a.

1.	Water	85-90%
2.	Lactose	4-5%
3.	Fat or Protein	3-4%
4.	Fat or Protein	3-4%
5.	Minerals	16-18%

   b. 1. Lactose and protein and minerals.
      2. Solids nonfat and fat.

4. Answered to the satisfaction of the instructor. (Trends are variable).

5. a. Commercial dairy:
      1. Primary income from sale of milk.
      2. Maintains Grade cows.
      3. Most replacement stock is purchased.
   b. Purebred producer:
      1. Maintains purebred cows.

ANSWERS TO TEST

        2. Primary income from sale of milk.
        3. Supplemented income from sale of replacement stock.
    c. Purebred breeder:
        1. Primary income from sale of replacement stock.
        2. Sale of milk supplements income.
    d. Milk production as a sideline:
        1. Usually grade cow herd.
        2. Can be grade A or grade B milk.
        3. Supplements other farming enterprizes.

6. a. 1,3
    b. 3
    c. 4
    d. 4,5

7. Any six:
    a. Feed
    b. Labor
    c. Capital
    d. Land
    e. Supporting services
    f. Market
    g. Management

8. Any six of the following:
    a. Record-keeping
    b. Milking
    c. Feeding
    d. Business management
    e. Breeding
    f. Labor management
    g. Housing management
    h. Herd health management

9. Answered to the satisfaction of the instructor.

10. a. Milking herd (health, nutrition and breeding).
    b. The raising of replacement heifers.
    c. Feed production and management.
    d. The handling of milk.

11. a. Preparing cow
        1. Wash-dry-disposable towel
        2. Strip into a cup

ANSWERS TO TEST

- b. Attach milking machine
  - 1. Within a minute to a minute and a half after wash.
  - 2. Milk for 3-6 mins, machine strip for only a few seconds.
- c. Remove milking machine
  - 1. Break vacuum and remove promptly.
  - 2. Don't overmilk.
- d. After milking
  - 1. Dip teats
  - 2. Record milk weights
  - 3. Clean machine and lines

12. a. Costs (5 or 6)
  - 1. Interest
  - 2. Feed
  - 3. Vet bills
  - 4. etc.
- b. Returns (3 or 4)
  - 1. Milk sales
  - 2. Sales of cull animals
  - 3. Sale of breeding stock (registered herds).

LIVESTOCK PROGRAMS

UNIT V

HORSE PRODUCTION AND MANAGEMENT

TERMINAL OBJECTIVE

Upon completion of this unit, the student will have awareness and understanding of the horse industry, skills required of a manager and what is contained in a successful horse breeding enterprize.

SPECIFIC OBJECTIVES

After completion of this unit, students will be able to:

1. Match terms relating to horse production and management with their definitions.
2. Briefly discuss the history and present status of the U.S. horse industry.
3. List five uses of horses in the United States today.
4. Answer questions concerning proper grooming and footcare.
5. Outline the stages of a training program.
6. Name four compentencies required of a successful horse breeder.
7. Identify common equipment (tack) used by a horseman.
8. Answer questions concerning the business aspects of horse production.
9. List six horse-related careers.

LIVESTOCK PROGRAMS

UNIT V

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheet
2. Provide students with Information and Assignment Sheets
3. Make transparencies
4. Plan a field trip to local horse producer(s)
5. Discuss Information and Assignment Sheets
6. Summarize unit by stressing management skills needed of a horse breeder
7. Participate in field trip
8. Give Test

Students:

1. Read Objective Sheet
2. Study Information Sheets
3. Participate in field trip
4. Discuss field trip and review information presented
5. Take Test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information Sheets
3. Transparency Masters

   TM 1 - TRAINING THE YOUNG HORSE

   TM 2 - WESTERN TACK

INSTRUCTIONAL MATERIALS

4. Test

5. Answers to Test

References:

1. Ensminger, M.E. Horses and Horsemanship, fifth edition, 1977, Interstate Publishers, Danville, Illinois.

2. Ensminger, M.E. The Stockman's Handbook, fifth edition, 1978, Interstate Publishers, Danville, Illinois.

3. Horsemanship and Horse Care, Agriculture Information Bulletin No. 353, U.S.D.A.

LIVESTOCK PROGRAMS

UNIT V

INFORMATION SHEET

I. Terms and Definitions

A. Blood-horse - A pedigreed horse, usually associated with the Thoroughbred breed.

B. Blow-out - To either warm up or cool out a horse by walking and/or exercising.

C. Action - Movement of the feet and legs - ideally straight and true.

D. Alter - To castrate or geld vs. "Entire".

E. Frog - A triangular-shaped, elastic-like formation in the sole of the horse's foot.

F. Gait - A particular way of going, natural or acquired, usually a rhythmic movement of the feet and legs.

G. Gravel - A potentially serious condition of the hoof resulting from the penetration of gravel or dirt and subsequent gaseous infection.

H. Groom - A person who tends and cares for horses; an attendant.

I. Haute école - "High school" , highest form of horse training.

J. Hobbles - Straps attached to the pastern, fetlock or hocks to prevent a horse from straying.

K. Spavin - An enlargement - blood, bone or infection - that appears on the inside or front of a horse's leg.

L. Lunge (Longe) - The act of exercising a horse on the end of a long rope, usually in a circle.

M. Snafflebit - Mouthpiece with a joint in the center, most widely used of all bits.

N. Tack - Equipment used in riding and driving horses.

O. Puff - A localized swelling on the leg.

INFORMATION SHEET

II. The History, Present and Future Status of Horses

A. History

1. Use as food - 25,000 years ago to present
    a. Meat
    b. Milk
2. Military purposes - 1500 B.C. to present
    a. Knights
    b. Cavalry
    c. Drawn chariots and wagons
3. Sport
    a. Racing
    b. Hunting
    c. Prestige
4. Domestic
    a. Agriculture tillage
    b. Draw wagons
    c. Transportation

B. Today

1. Uses - sport most use
2. Population - 9 million
3. Value - $13 billion
4. Horse racing largest spectator sport

C. Future uses

1. Recreation
2. Entertainment
3. Livestock herding - 1/2 million horses for this use

INFORMATION SHEET

III. Top Uses of Horses in the United States

A. Recreation - (pleasure)

1. 1,434 horse shows in 1975
2. More 4-H horse and pony projects than beef

B. Spectator sport

1. Over 80 million attend horse races annually
2. Rodeos are maintaining popularity

C. Cow ponies and stock horses - for handling range herds in the west

D. Research - laboratory animals

E. Mounted police

1. Most effective in the management of crowds
2. Forest rangers
3. Canadian mounted police

IV. Proper Grooming and Foot Care

A. Common foot faults and corrections

1. Splay foot - front toes turned out, heels in. Trim outer half of the foot
2. Pigeon-toed - opposite of splay foot. Trim inner half of foot more than outer
3. Quarter crack - verticle crack on side of hoove - keep foot moist, use a corrective shoe, shorten toes
4. Cocked ankles - standing bent forward on fetlocks - lower heels to correct (45° is correct angle)
5. Contracted heels - close at the heels - lower heels to allow frog to carry more of the weight

INFORMATION SHEET

B. Common hoof care tools

1. Knife - to clean foot and trim the frog
2. Nippers - to trim the hoof
3. Hoof level - to determine the angle of the hoof
4. Rasp - to level and smooth the hoof
5. Apron - to protect the Farrier (shoer)
6. Driving hammer
7. Nails - to attach shoes
8. Hoofpick - A metal pick for cleaning the feet

C. Grooming tools

1. Hoofpick - metal pick for cleaning the feet
2. Curry comb - metal or rubber comb used to remove caked mud or matted hair
3. Body brush - genetal grooming brush
4. Dandy brush - used to remove light dirt and brush mane and tail
5. Mane and tail comb - to comb out matted mane and tail
6. Sweat scraper - wood or metal tool for removing excess moisture

D. Procedure for grooming

1. Clean out feet
2. Groom body - use curry comb and brush
3. Brush head, comb and brush mane and tail

V. Horse Training

A. Training the foal - work with them regularly

1. Place halter on foal at 10-14 days of age
2. Tie foal, with mare, 15-30 mins. a day

INFORMATION SHEET

   3. Teach to lead
   4. Teach simple commands, stop and go, one at a time

B. Training the yearling - 30 min. lessons daily
   1. Teach "Whoa" and its name, i.e. "Whoa, Duke"
   2. Teach to stand when hobbled
   3. Introduce the saddle blanked
   4. Introduce the saddle, over five or six days

C. Training at eighteen months of age
   1. 30.mins. lessons daily
   2. Teach to drive, turn, stop and back up by using plowlines (TM 1)
   3. Teach to flex his neck and set his head (proper form)
   4. Teach to respond to a bosal and introduce leg pressure during light riding

D. Training the two year old
   1. Teach to respond to aids - legs, hand, voice etc.
   2. Teach to back
   3. Teach to western pivot (on rear legs)
   4. Teach to make a sliding stop (western)

E. General rules of training
   1. Never lose your temper when with the horse
   2. Teach one lesson at a time
   3. Repeat skills and give non-sugar rewards
   4. Be firm, but patient

INFORMATION SHEET

VI. Competencies of a Successful Horsebreeder

- A. Horse sense
    - 1. Loves horses
    - 2. Knows general horse behaviors
    - 3. Has much experience working with horses
    - 4. Non impulsive in judgement or decision-making
- B. Knowledge of equine nutrition
    - 1. What to feed
    - 2. When not to feed
- C. Uses competent health practices
- D. Competent reproduction management
- E. Superior at horse selection
- F. Maintains soundness of horses

VII. Tack

- A. Each horse should have his own:
    - 1. Saddle
    - 2. Bridle
    - 3. Halter
    - 4. Leadshank
- B. Bits
    - 1. Snaffle - most common
    - 2. Curb bit
    - 3. Hackamore bit
    - 4. Roper curved cheek bit
    - 5. Spade mouth bit
    - 6. Bar bit

INFORMATION SHEET

- C. Bridles and Hackamores
  - 1. Single bridle - one bit
  - 2. Double bridle - two bits, one snaffle bit and one curb bit, two head stalls, two pairs of reins
  - 3. Hackamores
    - a. Bosal hackamore
    - b. Hackamore bit bridle
    - c. No bit
- D. Saddles
  - 1. English
  - 2. Western
- E. Miscellaneous tack
  - 1. Breast plate
  - 2. Longe (lunge) - training line
  - 3. Martingales
  - 4. Saddle blanket
  - 5. Twitch
  - 6. Harness
  - 7. Blinders

VIII. The Business Aspects of Horse Production

- A. Management
  - 1. Have character, ability and leadership
  - 2. Experience
  - 3. Sets goals
  - 4. Gives incentive to employees

INFORMATION SHEET

B. Budgeting
   1. Allocate funds
   2. Manage income
   3. Handle cash flows
   4. Calculate profit and loss

C. Analyzing
   1. Calculate break even
   2. Determining the most profitable enterprizes
   3. Deciding upon future plans

D. Syndicating horses
   1. Spreads risk
   2. Other owners share liabilities and costs
   3. Allows an early return
   4. Can reduce debt

E. Stallion breeding contracts
   1. Contain pedigree
   2. Should be in writing
   3. Include management concerns - mare care
   4. Incentive - live foal

F. Boarding contracts
   1. Should be in writing
   2. Contain agreed upon care

G. Income taxes
   1. Determining if hobby or business
   2. Business,if a profit is made two out of five years

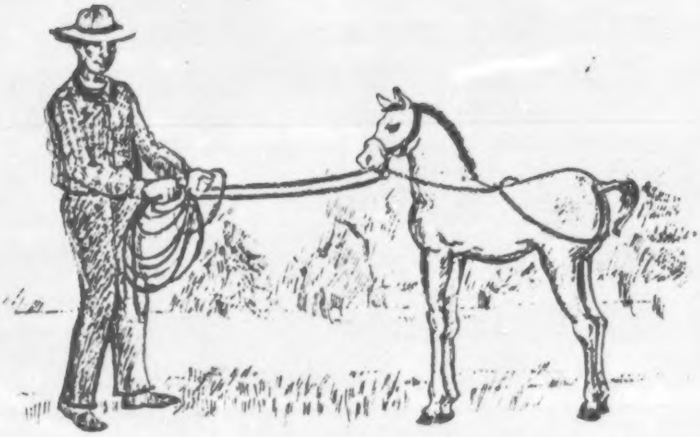
INFORMATION SHEET

- H. Liability
    - 1. Owner is responsible to all foreseeable actions of his horse
    - 2. Owner is responsible in case of negligence

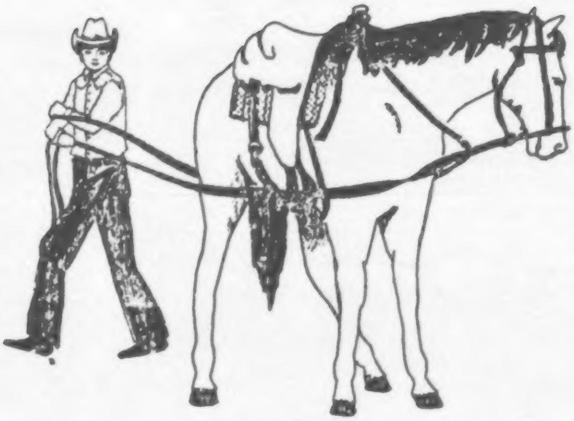
IX. Horse Related Careers

- A. Characteristics of a good horse employee (see section VI. A.)
- B. Careers in management
    - 1. Boarding stable operator
    - 2. Managing a breeding establishment
    - 3. Racing stable manager
    - 4. Show manager
- C. Horse related occupations
    - 1. Working with horse product companies
    - 2. Horse journalism
    - 3. Working for Registry Associations
    - 4. Harness maker
- D. Skilled professional
    - 1. Veterinaries
    - 2. College teaching
    - 3. Farrier (horse shoers)
    - 4. Horse trainer
    - 5. Riding school instructors
- E. Semi-skilled
    - 1. Groom or attendant
    - 2. Working with hunt clubs, summer camps
    - 3. Rodeo riding

TRAINING THE YOUNG HORSE

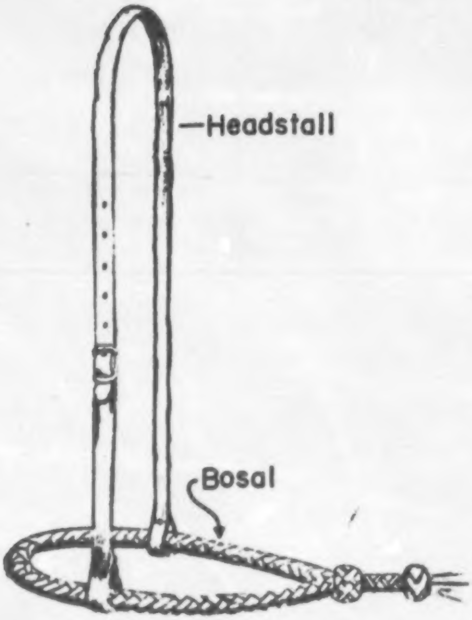


Training to Lead

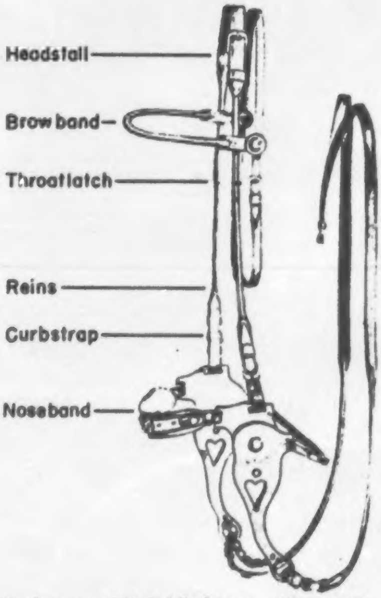


Using Plowlines
(18 months of age)

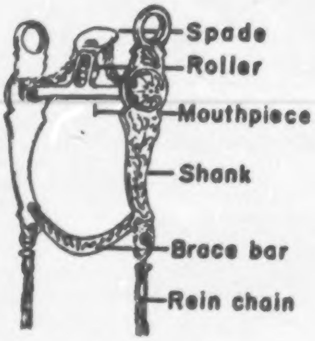
WESTERN TACK



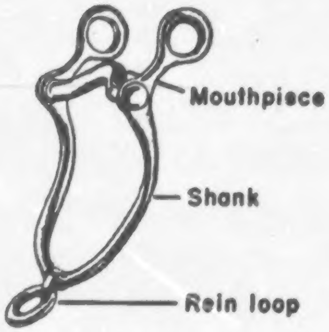
Bosal Hackamore: Popular for breaking horses.



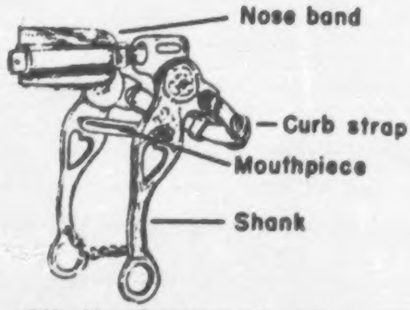
Hackamore Bit Bridle (removable mouthpiece): Used on Western cow ponies, and on young horses when they are being broken because it eliminates the possibility of injuring the mouth.



Spade Mouth Bit: Used on many stock horses.



Roper Curved Cheek Bit: Used on many roping horses.



Bit: Used on most cow

LIVESTOCK PROGRAMS

UNIT V

TEST

1. Match the following terms with their correct definitions.

_____a. Groom

_____b. Lunge

_____c. Spavin

_____d. Snaffle

_____e. Tack

_____f. Puff

_____g. Hobble

_____h. Farrier

1. Saddles and bridles.
2. A type of mouthpiece or "bit".
3. One who shoes horses.
4. A horse attendant.
5. A growth or enlargement appearing on the inside or front of a horse's leg.
6. A rope used in horse training.
7. A localized swelling on the leg.
8. To restrain a horse by strapping their legs together.

2. Briefly discuss the history and present states of the horse industry.

3. List five uses of horses in the U.S. today.

a.

b.

c.

d.

e.

TEST

4. a. Which of the following foot faults can be prevented or corrected by proper hoof trimming:

   1. Splay foot
   2. Pigeon toed
   3. Cocked Ankle
   4. All of the above

   b. Give the proper use of the following hoof care tools:

   1. Nippers -
   2. Hooflevel -
   3. Rasp -
   4. Hoof pick -

   c. Mark true or false the following statements by circling the appropriate letter.

   T F 1. Brushing a horse will clean it.

   T F 2. Do not use a curry comb below the knees.

   T F 3. The hooves should never require cleaning.

   T F 4. Never curry a horse when wet.

5. Outline the four stages of training a horse, and list two rules to follow in training.

   A.

   1.

   2.

TEST

B.

1.

2.

C.

1.

2.

D.

1.

2.

E.

1.

2.

6. Name four competencies required of a successful horse breeder.

   a.

   b.

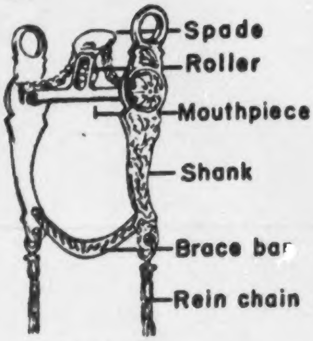
   c.

   d.

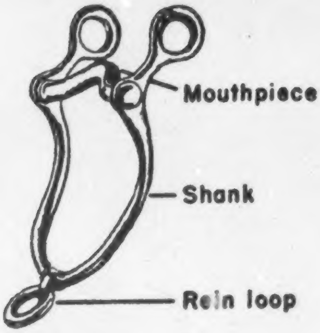
TEST

7. Identify the following tack articles:

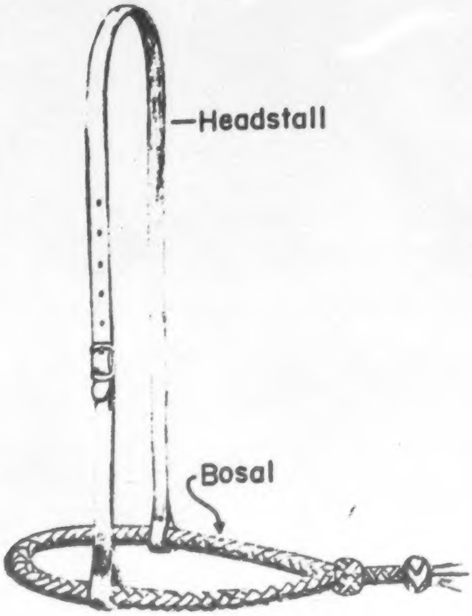
a. ________________



b. ________________



c. ________________



TEST

8. Answer the following questions concerning the business aspects of horse production.

   A. Which reason below is not a benefit realized by syndicating:

   _____1. Lowers financial risk.

   _____2. Allows an early return on your investment.

   _____3. Results in higher quality offspring.

   _____4. Other owners share liabilities and costs.

   B. Mark true or false the following statements by circling the appropriate letter:

   T F 1. Horse contracts rarely need to be more than verbal.

   T F 2. A horse business can be classed as either a hobby or business.

   T F 3. Under certain conditions, a horse owner may be liable if his horse is involved in an auto accident.

9. List six horse-related careers.

   a.

   b.

   c.

   d.

   e.

   f.

LIVESTOCK PROGRAMS

UNIT V

ANSWERS TO TEST

1. a. 4
   b. 6
   c. 5
   d. 2
   e. 1
   f. 7
   g. 8
   h. 3

2. Done to the satisfaction of the instructor.

3. a. Racing.
   b. Pleasure.
   c. Cattle Herding.
   d. Mounted police.
   e. Research (pharmaceutical etc.)

4. a. 4. All of the above.
   b. 1. Trim hooves.
      2. Maintain proper hoof angle (45°)
      3. Smooth hooves.
      4. Clean hooves.
   c. 1. T
      2. T
      3. F
      4. F

5. A. Training the foal - teach to lead, stop and go.
   B. Yearling - 1. Introduce saddle and blanket.
      2. Giddy-up and whoa.
   C. Eighteen months of age
      1. Train with plowlines.
      2. Light riding.
   D. Two-years old
      1. Riding skills
      2. Final polishing

ANSWERS TO TEST

E. 1. One lesson at a time.

2. Keep calm.

6. Any four of the following:

Horse sense	Reproduction
Equine nutrition	Selection
Health	Soundness

7. a. Spade mouth bit.

b. Roper curved cheek bit.

c. Bosal hackamore.

8. A. 3.

B. 1. F

2. T

3. T

9. Any horse-related career.

NUTRITION

UNIT I

ANIMAL NUTRIENTS

TERMINAL OBJECTIVE

Upon completion of this unit, the student will be able to list required feed nutrients, identify nutrient sources, deficiency symptoms, and define the roles of common feed additives. This objective will be considered achieved by scoring at least eighty-five percent on the test.

SPECIFIC OBJECTIVES

After completion of this unit, the student will be able to:

1. Match terms involved in feed nutrition with their correct definitions.
2. List the six major feed nutrients.
3. Identify the functions of the six nutrients
4. Identify sources of each nutrient
5. List the three types of protein and give an example of each
6. List the two types of minerals and give five examples of each
7. List the two types of vitamins and give two examples of each.
8. Match vitamins with their deficiency symptoms
9. Match minerals with their deficiency symptoms
10. Differentiate between the various types of feed additives and their functions

NUTRITION

UNIT I

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheet
2. Provide students with Information Sheets
3. Discuss Terminal and Specific Objectives
4. Discuss Information Sheets
5. Give Test

Students:

1. Read Objectives
2. Study Information Sheets
3. Participate in class discussion
4. Take Test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information Sheets
3. Test
4. Answers to Test

Supplemental information:

Discussion Topics (optional)

1. Current local feed-grain availability....
2. Current governmental controls concerning feed additives....

INSTRUCTIONAL MATERIALS

References:

1. "Cooperative Extension Service Bulletin," Kansas State University, L-528, February, 1979, File Code: Animal Science.
2. Kansas Vocational Agriculture, Basic Core Curriculum II.
3. Church, D. C., *Livestock Feeds and Feeding*, 1977, Church Publishing Co., Corvallis, Oregon.
4. Ensminger, M. E. and C. G. Olentene, 1978, *Feeds and Nutrition*-Abridged-1st Edition, Ensinger Publishing Co., Clovis, California.

INFORMATION SHEET

3. Source of insulation
4. Contain fat soluble vitamins

IV. Sources of Nutrients

A. Proteins
1. Cottonseed meal
2. Linseed meal
3. Soybean meal
4. Skim milk
5. Tankage
6. Alfalfa hay

B. Carbohydrates
1. Cereal grains
2. Non-legume roughage
3. Molasses

C. Minerals
1. Calcium - good quality roughage
2. Phosphorus - high protein concentrate, steamed bone meal, and rock phosphate
3. Sodium chloride - salt block
4. Potassium - feed sources
5. Sulfur - feed sources
6. Iron - good roughage
7. Copper - feed sources (use pre-mix)
8. Zinc - feed sources (use pre-mix)
9. Iodine - Iodized salt
10. Cobalt - cobalt supplement

INFORMATION SHEET

11. Magnesium - magnesium sulphate, magnesium oxide, dolmitic limestone

12. Selenium - feed sources, supplement - maximum supplement 1 ppm

D. Vitamins

1. A - Alfalfa hay, dehydrated alfalfa meal, and fish oil

2. B - Produced in the rumen (commercial sources)

3. D - Sun cured hay of good quality

4. K - Produced in the rumen (commercial sources)

5. E - Good quality leafy alfalfa hay or green feed and cereal grains

E. Fats

1. Tallow

2. Animal products

3. Seeds

V. Three Types of Proteins

A. Plant

1. Soybean meal

2. Cottonseed meal

3. Linseed meal

4. Peanut oil meal

B. Animal

1. Tankage

2. Fish meal

3. Meat scraps

4. Dried milk products

5. Blood meal

INFORMATION SHEET

C. Non-protein nitrogen (Ruminunts only)

1. Urea
2. Lush grasses
3. Brurete
4. Amoniated feeds

VI. Types of Minerals

A. Macro minerals - needed in larger amounts than minor minerals

1. Calcium (Ca)
2. Phosphorus (P)
3. Sodium Chloride (NaCl)
4. Potassium (K)
5. Sulfur (S)

B. Micro minerals - needed in relatively small amounts. As a group, they make up less than 1% of total minerals in the body

1. Iron (Fe)
2. Copper (Cu)
3. Zinc (Zn)
4. Iodine (I)
5. Cobalt (Co)
6. Magnesium (Mg)
7. Manganese (Mn)
8. Selenium (Se)

VII. Types of Vitamins

A. Fat soluble

1. Vitamin A
2. Vitamin D

INFORMATION SHEET

3. Vitamin E

4. Vitamin K

B. Water soluble

1. B complex

2. Vitamin C

3. Others

VIII. Results of Vitamin Deficiencies

A. Vitamin A

1. Blindness

2. Loss of young

3. Poor development of bones

4. Slow growth

B. Vitamin D

1. Bone deformities

2. Rickets

C. Vitamin E

1. Reproductive failure

2. Stiff lamb disease or white muscle disease

3. Abnormalities in young

D. Vitamin K

1. Internal bleeding

2. Lung deformities resulting in death

E. Vitamin B complex

1. Muscular weakness - all

2. Abnormalities in young - all

3. Reproductive failure - B_{12}

4. Goose stepping in swine - Pantothenic acid

INFORMATION SHEET

IX. Results of Mineral Deficiencies

A. Calcium

1. Rickets
2. Broken bones
3. Poor gains
4. Milk fever

B. Phosphorus

1. Lameness
2. Stiffness of joints
3. Unthriftiness
4. Reproductive problems
5. Lower milk production
6. Can cause calcium deficiency if not proper Ca-P balance: proper ratio - 2 to 1

C. Sodium chloride

1. Lack of appetite
2. Unthrifty appearance
3. Lower reproductive performance
4. Lower general production

D. Potassium

1. Slow growth rate
2. Reduced feed consumption
3. Stiffness
4. Shock

E. Sulfur

1. Unthriftiness
2. Sheep show reduced wool growth

INFORMATION SHEET

F. Iron

  1. Anemia

G. Iodine

  1. Hairless pigs
  2. Goiter - Over development of the thyroid gland

H. Copper

  1. Anemia
  2. Nervous symptoms
  3. Lameness, swelling of joints

I. Cobalt

  1. Loss of appetite
  2. Unthriftiness
  3. Delayed sexual development
  4. Rumenants may show symptoms similar to Vit. B_{12} deficiency

J. Manganese

  1. Reduced fertility
  2. Abortion
  3. Deformed young
  4. Enlarged joints
  5. Stiffness
  6. Twisted legs
  7. Poor growth

K. Selenium

  1. White muscle disease
  2. Death of young following birth

INFORMATION SHEET

X. Feed Additives

  A. Growth stimulants

    1. Stimulate weight gains

    2. Reduced feed requirements per unit of gain

    3. Examples

      a. Ralgro - implant

      b. MGA - for heifers

      c. Synovex - S for steers, H for heifers

      d. Diethel stilbestrol - now illegal

  B. Additives that alter rumen metabolism

    1. Monensin (Rumensin)

      a. Modifies rumin carbohydrate metabolism

      b. Reduces feed requirements per unit of gain

    2. Methane inhibitors

      a. Purpose is to lessen energy loss from methane

      b. Being researched for efficiency and feasibility

  C. Antibloat compounds - Poloxalene (Bloat Guard)

  D. Antibiotics

    1. Increase gains, prevent certain diseases

    2. Antibiotics used in feed rations

      a. Aureomycin

      b. Terramycin

      c. Penicillin

      d. Streptomycin

NUTRITION

UNIT I

TEST

1. Match the following terms with their appropriate definitions on the right.

_____a. Feed additives

_____b. Antibiotics

_____c. Vitamins

_____d. Amino acids

_____e. Starches

_____f. Essential amino acids

_____g. Digestible protein

_____h. Proteins

_____i. Minerals

_____j. Non-protein nitrogen

1. Complex chemicals essential for normal functions
2. Elements which are necessary for proper body functions and life processes
3. Nutrients essential in body growth and repair
4. Carbohydrates which supply energy to animals
5. Substances added to a ration to perform a specific function
6. Amino acids that cannot be produced by the animal itself
7. Substances used in small amounts to help prevent and control certain diseases in animals
8. Building blocks of protein
9. Proportion of feed which represents protein the animal can use
10. Dietary nitrogen fed to ruminant animals as a component of protein synthesized in the rumen

2. List the six major feed nutrients.

a. ____________________

b. ____________________

c. ____________________

d. ____________________

e. ____________________

f. ____________________

TEST

3. Identify the functions of the six nutrients by filling in the blanks with the corresponding nutrient name.

   a. The nutrient that maintains osmotic pressure in the body is ______________________.

   b. Two nutrients that supply most of the energy used by the body are ____________________ and ______________________.

   c. ________________________ regulate pH of digestive tract fluids.

   d. ________________________ are a source of insulation.

   e. ________________________ removes waste material from the body.

4. Identify sources of each nutrient by writing the name of the nutrient beside each of the following nutrient sources.

   __________________________ a. Soybean meal

   __________________________ b. Molasses

   __________________________ c. Tallow

   __________________________ d. Salt block

   __________________________ e. Tankage

   __________________________ f. Cereal grains

5. List the three types of protein and give an example of each.

Type	Example
a. _________________________	____________________________
b. _________________________	____________________________
c. _________________________	____________________________

6. Differentiate between the following macro and micro minerals by placing an X in front of the macro minerals.

   _____a. Sulfur

   _____b. Potassium

   _____c. Cobalt

   _____d. Calcium

   _____e. Iodine

   _____f. Iron

   _____g. Phosphorus

   _____h. Copper

TEST

7. List the two types of vitamins and give two examples of each.

Type	Examples
a. ______________________	____________________________
	____________________________
b. ______________________	____________________________
	____________________________

8. Match the following vitamins on the left with their corresponding deficiency symptom on the right.

_____a. Vitamin B   1. Internal bleeding

_____b. Vitamin D   2. Muscular weakness

_____c. Vitamin K   3. Loss of young

_____d. Vitamin E   4. Rickets

_____e. Vitamin A   5. Blindness

9. Match the minerals on the left with their corresponding deficiency symptom(s) on the right. Two minerals have two deficiency symptoms listed.

_____a. Calcium   1. Anemia

_____b. Iron   2. Rickets

_____c. Manganese   3. Hairless pig

_____d. Iodine   4. Goiter

_____e. Cobalt   5. Abortion

_____f. Selenium   6. Deformed young

7. Delayed sexual development

8. White muscle disease

10. Differentiate between the various types of feed additives and their functions in the multiple choice questions below.

_____a. The feed additive Poloxalene functions to: a) increase weight gains b) prevent blindness c) prevent bloat d) stimulate fertility

TEST

_____b. The growth stimulant that is now banned from use is:
a) Ralgro b) Diethyl Stilbestrol c) Synovex H
d) Synovex S

c. Name two antibiotics used in feed rations.

i. ________________________

ii. ________________________

NUTRITION

UNIT I

ANSWERS TO TEST

1. a. 5
   b. 7
   c. 1
   d. 8
   e. 4
   f. 6
   g. 9
   h. 3
   i. 2
   j. 10

2. a. water
   b. proteins
   c. carbohydrates
   d. minerals
   e. vitamins
   f. fats

3. a. water
   b. proteins
   c. minerals
   d. fats
   e. water

4. a. proteins
   b. carbohydrates
   c. fats
   d. minerals
   e. proteins
   f. carbohydrates

5.

Type of protein	Examples
a. plant	1. soybean meal
	2. cottonseed meal
	3. linseed meal
	4. peanut oil meal
b. animal	1. tankage
	2. fish meal
	3. meat scraps
	4. dried milk products
	5. blood meal
c. non-protein nitrogen	1. urea
	2. brurete
	3. amoniated feeds
	4. lush grasses

ANSWERS TO TEST

6. Macro minerals are a, b, d, g.

7.

Type of vitamin	Examples
a. fat soluble	1. Vitamin A
	2. Vitamin D
	3. Vitamin E
	4. Vitamin K
b. water soluble	1. B complex
	2. Vitamin C
	3. Others

8. a. 2
   b. 4
   c. 1
   d. 3
   e. 5

9. a. 2
   b. 1
   c. 5,6
   d. 3,4
   e. 7
   f. 6,8

10. a. C
    b. B
    c. Any two of the following:
       1. Bacitracin
       2. Chlortetrocycline
       3. Erythromycin
       4. Lincomycin
       5. Penicillin
       6. Streptomycin
       7. Tylosin

NUTRITION

UNIT II

DIGESTIVE SYSTEMS

TERMINAL OBJECTIVE

Upon completion of this unit, the student will be able to differentiate between monogastric and polygastric animals, list and note the function of the various parts of the digestive system, and trace the pathway of ingested feed. This objective will be considered achieved by scoring at least eighty-five percent on the test.

SPECIFIC OBJECTIVES

After completion of this unit, the student will be able to:

1. Match terms dealing with parts and functions of digestive systems with their correct definitions.
2. Classify animals according to types of digestive systems
3. Name four glands that aid in the breakdown of feed
4. List the functions provided by each of the seven parts of the digestive system
5. Select the correct function for each ruminant compartment
6. Identify functions of rumen microbes
7. Compare the volume of young and mature ruminant stomachs
8. Label the main components of the swine and cattle digestive tracts

NUTRITION

UNIT II

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheet
2. Provide students with Information Sheets
3. Make Transparencies
4. Discuss Terminal and Specific Objectives
5. Discuss Information Sheets
6. Give Test

Students:

1. Read Objectives
2. Study Information Sheets
3. Take Test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information Sheets
3. Transparency Masters
    TM 1 - DIGESTIVE SYSTEM OF SWINE
    TM 2 - DIGESTIVE SYSTEM OF THE COW
    TM 3 - THE THREE POSSIBLE ROUTES OF FEED IN RUMINANTS
    TM 4 - SIMPLE DIGESTIVE SYSTEM OF THE CHICKEN
4. Test
5. Answers to Test

INSTRUCTIONAL MATERIALS

Optional activities:

1. Obtain a monogastric digestive tract from a local packing plant and dissect, studying various componants.
2. Obtain a ruminant digestive tract (digesta removed) and dissect to study compartment variations.

References:

1. Kansas Vocational Agriculture Education Basic Core Curriculum II.
2. Missouri Animal Science Curriculum Guide
3. Principles of Animal Science Fall 1980 Curriculum from the agriculture department of Highland Community College, Highland, Kansas.
4. Ensminger, M.E., and G.G. Olentine Jr., Feeds and Nutrition -- abridged, The Ensminger Publishing Co., Clovis, California, 1978.
5. Working in Animal Science, Paul Peterson, Allen C. Christensen and Edward A. Nelson, McGraw-Hill Book Company, San Francisco, California, 1978.

NUTRITION

UNIT II

INFORMATION SHEET

I. Terms and Definitions

A. Digestion - The process of preparing the food ingredients for passage into the blood stream

B. Absorption - The passing of food materials from the digestive tube into the body after they are digested or dissolved

C. Enzymes - The organic compounds with power to break down other organic compounds without themselves' being changed

D. Hormones - The internal body secretions that regulate various body processes

E. Mastication - The grinding or chewing of feed to aid in digestion

F. Metabolism - The chemical change which food undergoes within the body following absorption into the blood

G. Excretion - The removal of water and waste material from the body

H. Regurgitation - The process whereby food eaten by ruminants is carried from the second stomach and the rumen into the gullet and then forced up to the mouth for chewing

I. Feces - The manure or the undigested material and wastes expelled at the end of the digestive tube

J. Pancreatic juice - The clear, watery fluid with an alkaline reaction secreted by the pancreas that aids in feed breakdown

K. Bile - The thin, yellowish-brown or greenish liquid secreted by the liver which emulsifies fats to aid in their digestion

L. Ruminant animal - The animal with four compartments in the stomach (polygastric)

M. Gastro-intestinal tract (GIT) - All parts of the digestive system

N. Hydrochloric acid (HCl) - A digestive acid produced in the stomach of monogastrics and abomasum of ruminants

O. Mucus membrane - Slick slimey inside surface of the GIT which protects the stomach and intestinal linings from digestive enzymes and acids

P. Esophagus - Hollow tube and passageway from the mouth to the stomach

INFORMATION SHEET

Q. Eructation - The expelling of excess digestive gases from the rumen or stomach

R. Esophegeal groove - The structure that prevents milk from entering the rumen in young ruminant animals

S. Rumen, reticulum, omasum, abomasum - The four main compartments of the ruminant stomach

T. Bloat - The result of an unrelieved buildup of digestive gases or froth as a result of improper digestion or clinical problem

U. Microbial fermentation - The digestion of feed with in the rumen by microscopic organisms

II. Types of Digestive Systems

A. Monogastric - SIMPLE - One compartment (TM 1)

1. Pig
2. Horse
3. Rabbit
4. Man
5. Dogs and cats

B. Polygastric - RUMINANTS - Four compartments (TM 2,3)

1. Examples

a. Cow

b. Goat

c. Sheep

d. Deer

C. Avian (chickens and other foul. TM 4)

III. Glands That Aid in Feed Breakdown

A. Thyroid - Secretes thyroxine, a hormone that regulates metabolism

B. Parathyroid - Concerned with calcium metabolism

C. Pituitary - Secretes lactogen and other hormones to control body processes

D. Adrenal - Secretes adrenaline, a hormone to stimulate body processes

INFORMATION SHEET

- E. Pancreas - Secretes pancreatic juice which contains many enzymes
- F. Liver - Secretes bile, which breaks down fats
- G. Salivery glands - Secretes saliva

IV. Parts and Functions of the Digestive System

- A. The simple digestive system
  - 1. Mouth
    - a. Food chewed into small particles
    - b. Saliva added starting carbohydrate digestion
  - 2. Esophagus - Passageway to the stomach
  - 3. Stomach
    - a. Hydrochloric acid is added
    - b. Gastric enzymes added
    - c. Partial digestion of carbohydrates, proteins, and fats
  - 4. Small intestine
    - a. Walls of intestine secrete and add enzymes
    - b. Bile is added from gallbladder to emulsify (disperse) fats
    - c. Pancreatic juices are added
    - d. Digestion and absorption occur
  - 5. Cecum
    - a. Site of fiber digestion and microbial activity in rabbits and horses
    - b. Little used in most animals
  - 6. Large intestine
    - a. Water absorbed
    - b. Slight bacterial digestion, water absorption and endogenous secretions
  - 7. Anus - Passage to expell undigested portions of the feed and other waste materials

INFORMATION SHEET

V. Functions of Ruminant Stomach (cattle, sheep, goats) (TM 3,5)

  A. Rumen (paunch)

    1. Approximate volume of 50 gallons

    2. Food is agitated and fiber is digested by bacteria

    3. Provides favorable environment for rumen microbes

    4. Is the site of microbial digestion and rebuilding of proteins and many vitamins

    5. Acetic acid, propionic acid, and buteric acid from carbohydrate digestion are obsorbed into bloodstream through rumen wall

  B. Reticulum (Honeycomb)

    1. Collection compartment for foreign objects

    2. Transfers ingested material to rumen

  C. Omasum (Manyplies)

    1. Feed is ground up

    2. Excess water is squeezed out

  D. Abomasum (True stomach)

    1. Digestive juices are added

    2. Functions similar to simple stomach

VI. Functions of Rumen Microbes

  A. Digestion of feed

    1. Cellulose breakdown

    2. Protein breakdown (proteolysis)

  B. Synthesis of essential nutrients

    1. Vitamins B, K, C

    2. Rebuilding of essential amino acids

INFORMATION SHEET

3. Production of protein from ammonia freed by protein breakdown or ingested NPN

C. The microbes themselves are a nutrient source for the host animal when they pass on into the lower gut

VII. Comparison of Young and Mature Ruminant Stomachs By Volume

A. Young - immature ruminant stomach

1. Abomasum - 70%

2. Rumen - 20%

3. Omasum - 7-8%

4. Reticulum - 3-5%

B. Mature ruminant stomach

1. Rumen - 70-80%

2. Omasum - 7-8%

3. Abomasum - 7-8%

4. Reticulum - 5%

VIII. Components of Digestive Tracts

A. Swine

1. Mouth

2. Esophagus

3. Stomach

4. Small intestine

5. Cecum

6. Large intestine

7. Rectum

B. Cattle

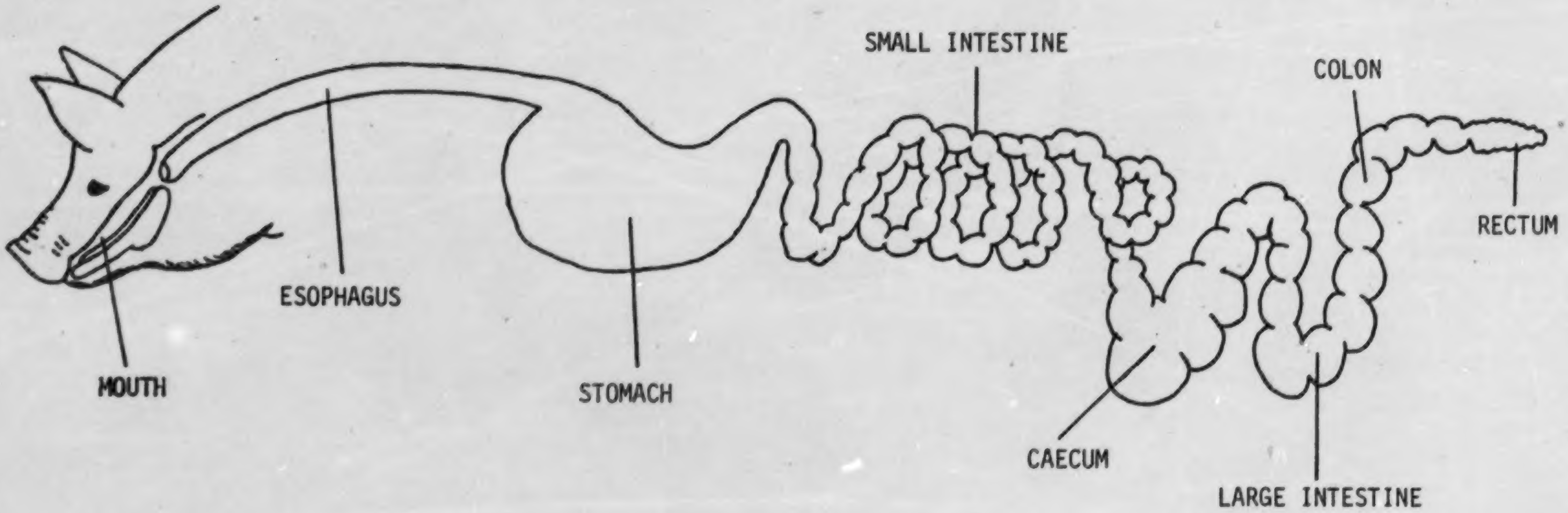
1. Mouth

2. Esophagus

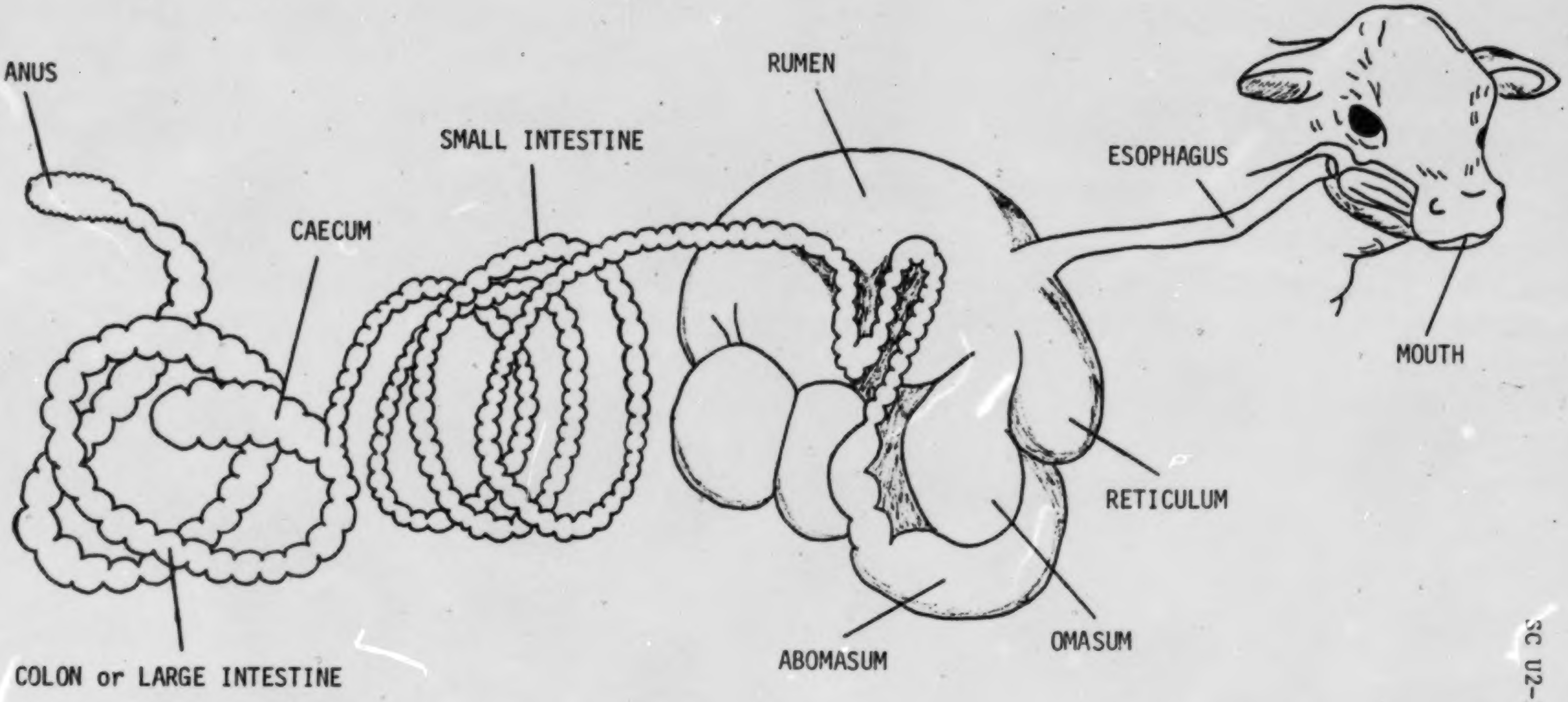
INFORMATION SHEET

3. Reticulum
4. Rumen
5. Omasum
6. Abomasum
7. Small intestine
8. Cecum
9. Large intestine
10. Anus

DIGESTIVE SYSTEM OF SWINE



DIGESTIVE SYSTEM OF THE COW



TM 2

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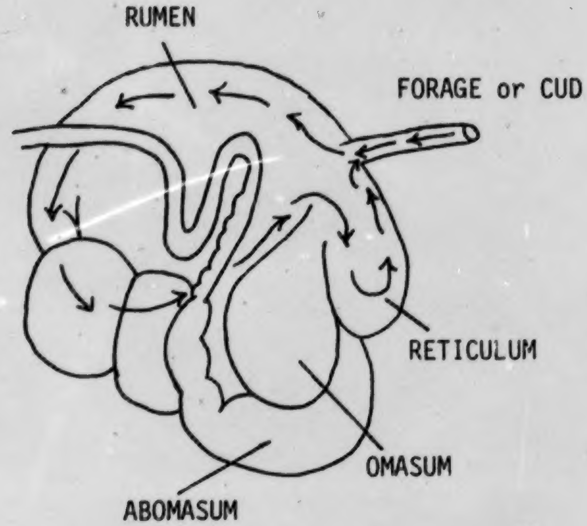
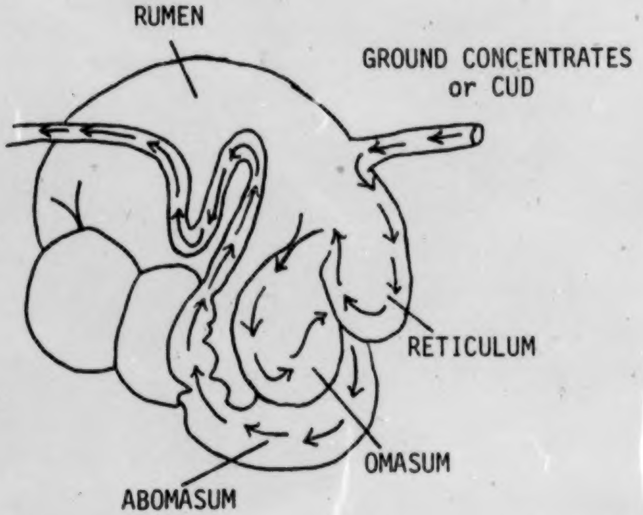
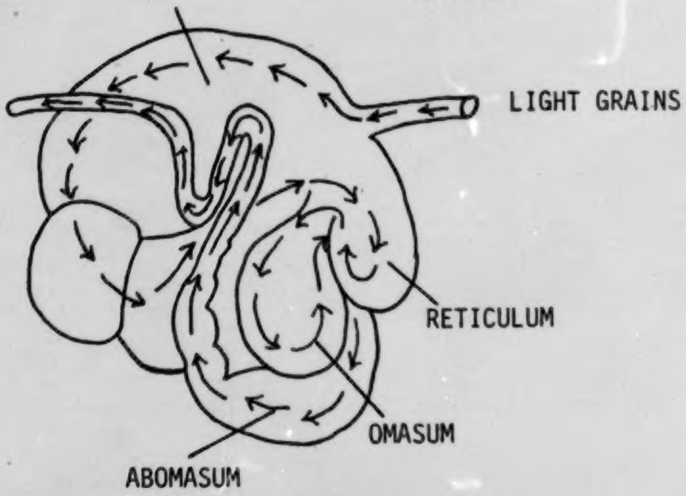
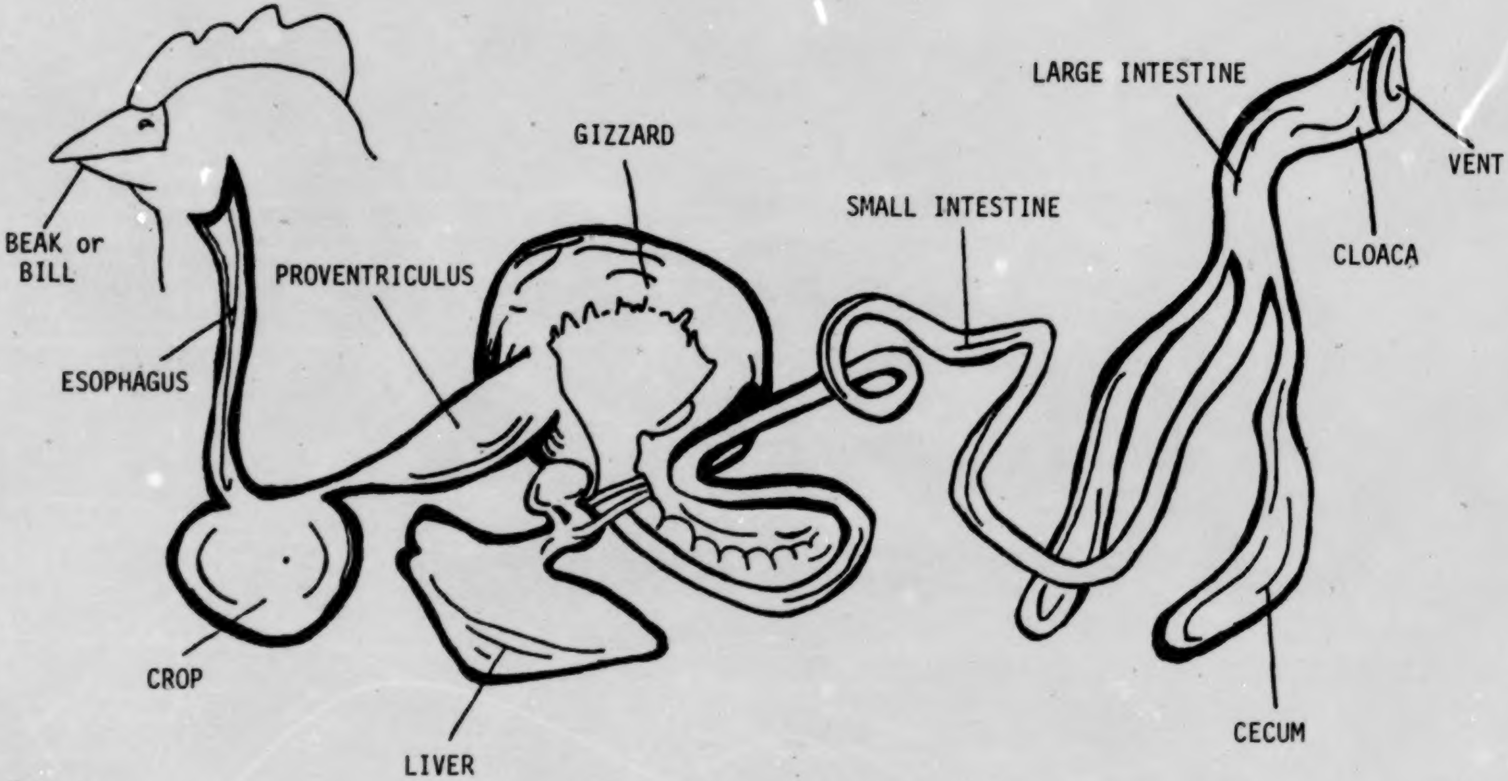
THE THREE POSSIBLE ROUTES OF FEED IN RUMINANTS







SIMPLE DIGESTIVE SYSTEM OF THE CHICKEN



TM 4

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NUTRITION

UNIT II

TEST

1. Match the following terms with their correct definitions.

_____a. Digestion
_____b. Feces
_____c. Bile
_____d. Microbial fermentation
_____e. Esophagus
_____f. Enzymes
_____g. Excretion
_____h. Pancreatic juice
_____i. Bloat
_____j. Mucus membrane

1. The result of an unrelieved build up of digestion gases or froth as a result of improper digestion or clinical problem.
2. The manure or the undigested material and wastes expelled at the end of the digestive tube.
3. The process of preparing the food ingredients for passage into the blood stream.
4. The organic compounds with power to breakdown other organic compounds without themselves being changed
5. The thin, yellowish-brown or greenish liquid secreted by the liver which emulsifies fats to aid in their digestion.
6. Slick slimey inside surface of the GIT which protects the stomach and intestinal linings from digestive enzymes and acids.
7. The clear, watery fluid with an alkaline reaction secreted by the pancreas that aids in feed breakdown
8. The removal of water and waste material from the body
9. The digestion of feed with in the rumen by microscopic organisms.
10. Hollow tube and passageway from the mouth to the stomach.

TEST

2. In the list below place an "S" by the simple stomach and an "R" by the ruminant animal.

_____ a. Horse
_____ b. Cow
_____ c. Pig
_____ d. Sheep
_____ e. Man
_____ f. Goat
_____ g. Chicken
_____ h. Dog
_____ i. Rabbit

3. From the list at the right select four glands that aid in the utilization of feed.

a. ____________________
b. ____________________
c. ____________________
d. ____________________

Liver
Lymph gland
Thyroid
Parathyroid
Mammary
Pancreas
Salivary glands
Ovary

4. List the function provided by each of the seven parts of the digestive system.

Digestive System Part	Function of each part
a. Mouth	____________________
b. Esophagus	____________________
c. Stomach	____________________
d. Small intestine	____________________
e. Cecum	____________________
f. Large intestine	____________________
g. Anus	____________________

TEST

5. Select the correct function for each ruminant compartment.

_____a. Omasum

_____b. Reticulum

_____c. Abomasum

_____d. Rumen

1. Adjoins the rumen and collects heavy particles

2. Squeezes out water

3. Site where enzymatic digestion occurs

4. Site where microbial digestion occurs

6. Place a check by the items below which are functions of rumen microbes.

_____a. A nutrient source for the host

_____b. Secreate milk

_____c. Reconstruct

_____d. Allows the cow to utilize non-protein nitrogen

_____e. Make vitamins

_____f. Make minerals

_____g. Digest roughages

_____h. Enable the cow to see at night

7. Compare the volume of young and mature ruminate stomachs by placing an "M" for mature animals or a "Y" for young animals.

______a. Rumen capacity of 50 gallons

______b. Digest hay easily and in large amounts

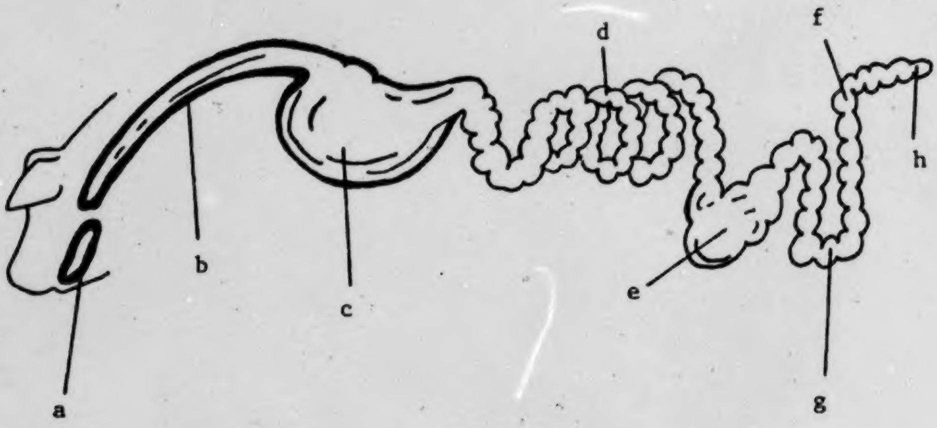
______c. The abomasum is the largest compartment

8. Label the main component of the swine and cattle digestive tracts by identifying the parts on the following drawings:

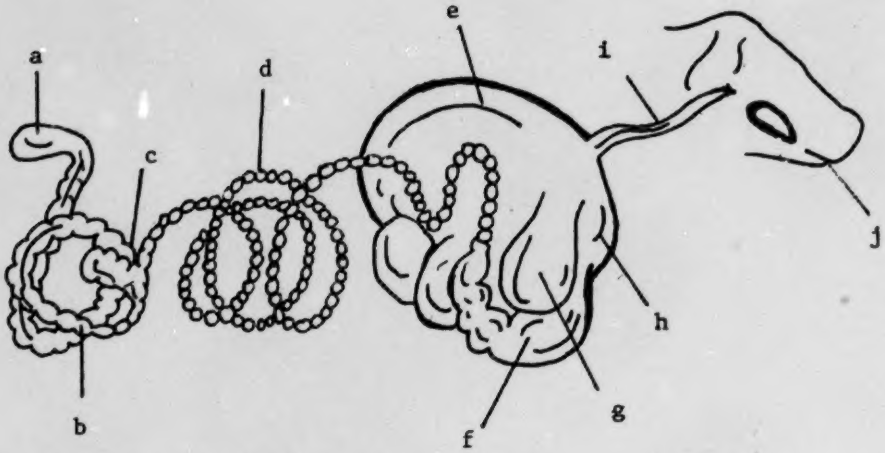
(write answers on answer sheet)

TEST

A.



B.



C. Answers to the parts of the digestive system for swine and beef.

A. Swine	B. Beef
a. ______	a. ______
b. ______	b. ______
c. ______	c. ______
d. ______	d. ______
e. ______	e. ______
f. ______	f. ______
g. ______	g. ______
h. ______	h. ______
	i. ______

NUTRITION

UNIT II

ANSWERS TO TEST

1. a. 3
   b. 2
   c. 5
   d. 9
   e. 10
   f. 4
   g. 8
   h. 7
   i. 1
   j. 6

2. a. S
   b. R
   c. S
   d. R
   e. S
   f. R
   g. S
   h. S
   i. S

3. Any four of the following:
   a. Liver
   b. Thyroid
   c. Parathyroid
   d. Pancreas
   e. Salivary glands

4.	a.	Mouth	Food chewed and saline added
	b.	Esophagus	Passageway to the stomach
	c.	Stomach	Hydrochloric acid and gastric enzymes added and partial digestion
	d.	Small intestine	Enzymes, bile, pancreatic juices are added
	e.	Cecum	Fiber digestion, microbial activity in rabbits and horses
	f.	Large intestine	Water absorbed, slight bacterial digestion, endogenous secretions
	g.	Anus	Passage to expell undigested portions of the feed and other waste materials

5. a. 2
   b. 2
   c. 3
   d. 4

ANSWERS TO TEST

6. Those that should be checked are:

   a. c. d. e. g.

7. a. M

   b. M

   c. Y

8. A. Swine

   a. mouth
   b. Esophagus
   c. Stomach
   d. Small intestine
   e. Cecum
   f. Colon or Large intestine
   g. Large intestine or Colon
   h. Rectum

   B. Beef

   a. Anus
   b. Colon or Large intestine
   c. Cecum
   d. Small intestine
   e. Rumen
   f. Abomasum
   g. Omasum
   h. Reticulum
   i. Esophagus
   j. Mouth

NUTRITION

UNIT III

FEEDSTUFF CLASSIFICATION

TERMINAL OBJECTIVE

Upon completion of this unit, the student will know the basic composition of feeds, will be able to classify a given feedstuff as a roughage, concentrate or supplement feed, and recognize the value of feed analysis. This objective will be considered achieved by scoring at least eighty five percent on the test.

SPECIFIC OBJECTIVES

After completion of this unit, the student will be able to:

1. Define eight terms related to feed analysis and classification
2. Mark true or false six statements related to feed composition
3. Select from a list those characteristics unique to roughage feeds
4. List five types of concentrates and give an example and characteristic of each
5. Name the four types of supplement feeds
6. List three sources of feed analysis information and tell how it can be used by the farmer
7. Use NRC (National Research Council) feed tables to arrange in order five feeds according to their energy content.
8. List five items of information which must be included on a feed tag
9. Identify four factors that can lower feed quality
10. Name three methods of determining feed quality

NUTRITION

UNIT III

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheet
2. Provide students with Information Sheets
3. Make Transparencies
4. Discuss Terminal and Specific Objectives
5. Discuss Information Sheets
6. Give Test

Students:

1. Read Objectives
2. Study Information Sheets
3. Take Test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information Sheets
3. Transparency Masters

   TM 1 - FEED COMPOSITION

   TM 2 - CLASSIFICATION OF ROUGHAGES

   TM 3 - CLASSIFICATION OF CONCENTRATES

   TM 4 - CLASSIFICATION OF SUPPLEMENT FEEDS

   TM 5 - AVERAGE COMPOSITION OF SOME FEEDS

   TM 6 - COMMERCIAL FEED TAG

   TM 7 - COMMERCIAL LABORATORY FEED ANALYSIS FORM V

INSTRUCTIONAL MATERIALS

5. Test

6. Answers to Test

References:

1. Feed & Nutrition - Abridged, M. E. Ensminger, Charles G. Olentine, Jr., 1978, Ensminger Publishing Co. Clovis, California.

2. Feeds: Home Study Course, Farmland Industries, Kansas City, Mosouri, 1980, Revised.

3. Kansas Vocational Agriculture Education - Basic Core Curriculum II, State Department of Vocation and Technical Education, Stillwater, Oklahoma, 1971.

4. Livestock Feeds and Feeding, D.C. Church, 1977, O & B Books, Corvallis, Oregon.

5. The Stockmans Handbook, 5th Edition, M. E. Ensminger, The Interstate, Danville, Illonois, 1978.

NUTRITION

UNIT III

INFORMATION SHEET

I. Terms and Definitions

A. Roughage - The feeds high in fiber and low in net energy, example - hay, pasture and crop residues

B. Forage - Any high fiber feed, usually considered of higher quality than a roughage, however the terms are often interchanged

C. Silage - A forage crop fermented and stored under anarobic (air limiting) conditions in a silo

D. Concentrates - Feeds with a high proportion of digestable nutrients to the fiber content, example - grain and soybean meal

E. Fiber - The tough part of feed which is high in cellulose and low in digestibility

F. Supplement - A feed used with another, usually added to supply added amounts of nutrients deficient in the main ration

G. Premix - A mixture of nutrients or additives that must be diluted for safe feeding and may contain a variety of supplemental nutrients, example - vitamin premixes

H. Complete feed - A feed which meets all of an animal's dietary or nutritional requirements, except water

I. By-product feed - An animal feed that is a secondary result of a more important process, example - distillers grains, sugar beet pulp, soybean meal

J. Feed grade - Suitable for animal consumption

K. Medicated feed - A feed which contains drugs intended to increase production or treatment of disease or modification of body processes

L. Protein content - The amount of crude protein in a feedstuff, usually calculated as a percentage of the total weight, i.e. 14% protein

M. Dry matter basis - Feedstuff referred to as if the water were removed, the nutrient content of a feedstuff is usually analyzed on a dry matter basis where the water contained is not a part of the total weight

INFORMATION SHEET

N. As fed - Feedstuff referred to with the natural water included, i.e. as would normally be fed

O. Palatibility - The taste or animal acceptability factor of a feed

P. Ether extract - The fat portion of feed, found through an analysis process using liquid ether

Q. Ash - The portion of the feed remaining after burning at high temperature, contains primarily minerals

II. Feed Composition (TM 1)

A. Water   Dry matter
                  Ash (Minerals)   Organic matter
                          Protein   Carbohydrates, Fats
                  Nitrogen Free Extract   Crude Fiber
                          Simple sugar   Cellulose
                          Compound sugar
                          Starch

B. Feed grains are 85-90% dry matter

C. Steps in determining Percent Dry Matter of a feed

1. Weigh feed (normal or wet wt.)

2. Dry in oven at 100°C (85°C for silages)

3. Weigh again = Dry wt.

4. Calculate Percent Dry Matter

$$\frac{\text{Dry wt.}}{\text{Wet wt.}} \times 100 = \%\ \text{Dry Matter}$$

D. Carbohydrates

1. Crude fiber (Note: Cellulose is made up of many molecules of glucose)

2. Nitrogen free extract

    a. Sugars (examples: glucose, fructose)

    b. Starches

    c. Compound sugars

INFORMATION SHEET

III. Classification and Characteristics of Roughages (TM 2)

- A. Dry
    - 1. Hays
        - a. Grass
        - b. Legumes - alfalfa, clover (high in protein)
        - c. Easy to produce and store
        - d. Quality dependent upon maturity and proper storage
        - e. High in calcium and Vitamin A
    - 2. Hulls and Beet Pulp
        - a. Cottonseed, peanut, and almond
        - b. Availibility, locally dependent
        - c. Good source of fiber
    - 3. Straws and Crop Residue
        - a. Wheat, oats, barley, and rye
        - b. High in fiber
        - c. Low in protein
- B. Green forage
    - 1. Pasture, range, and green chop forgae
    - 2. Pasture and range most widely used forage source
    - 3. Green chop has equipment costs
- C. Silage
    - 1. Corn forage, sorghum forage, and grass
    - 2. Very acceptable to livestock
    - 3. Combination energy and fiber source

INFORMATION SHEET

IV. Classification and Characteristics of Concentrates (TM 3)

- A. Grains
  - 1. Examples
    - a. Corn
    - b. Wheat
    - c. Oats
    - d. Milo
    - e. Barley
  - 2. General characteristics of grains
    - a. High in energy (TDN)
    - b. Low in calcium protein (except wheat), and most vitamins
- B. Grain by-products
  - 1. Examples
    - a. Wheat bran
    - b. Wheat standard millings
    - c. Hominey feed, (from corn milling) high in energy
  - 2. Characteristics
    - a. High in protein
    - b. High in fiber
- C. Molasses
  - 1. Examples
    - a. Beet
    - b. Cane
  - 2. Characteristics
    - a. High in energy
    - b. Increases palatability

INFORMATION SHEET

- D. Oil meals - 30-50%
  - 1. Examples
    - a. Cottonseed
    - b. Linseed
    - c. Peanut
    - d. Soybean
  - 2. Characteristics
    - a. High in TDN
    - b. High in protein
- E. Animal products
  - 1. Examples
    - a. Meat scraps
    - b. Tankage
    - c. Fish meal
    - d. Dried dairy products
  - 2. Characteristics
    - a. High in protein
    - b. High in energy
    - c. Most are high in mineral content

V. Supplemental Feeds (TM 4)

- A. Protein supplement
  - 1. Plant protein
    - a. O. I Meal 30-50% C.P.
    - b. Corn mill feeds - 20-40%
    - c. Dehydrated alfalfa meal - 18-20%
    - d. Distillers or dryed brewers grains - 25% (brewers grains may not be balanced source of amino acids)

INFORMATION SHEET

        e. Wheat mill feeds - 15-25%

    2. Animal protein

        a. Meat scraps and meal

        b. Fish meal

        c. Dried dairy products

        d. Blood meal

    3. Non-protein - nitrogen

        a. Urea

        b. Ammonia

    4. Specific amino acid

B. Mineral supplement

    1. Generally offer additional amounts of salt, calcium, phosphorus, magnesium, and various trace minerals

    2. Common feeds and minerals they provide

        a. Salt - blocks and granulated

        b. Trace - mineralized salt, includes most trace minerals

        c. Dicalcium phosphate - calcium and phosphorus

        d. Limestone - calcium

        e. Bone meal - calcium and phosphorus

        f. Defluorinated rock phosphate - calcium, phosphorus, and sodium

C. Vitamin supplements

    1. Can be purchased in pure form

    2. Can be included in a pre-mix form

    3. Vitamins A, D, and E are vitamins often supplemented

    4. Vitamin A is supplemented most often

INFORMATION SHEET

D. Energy supplements

  1. Feed grains
  2. Milling by-products
  3. Molasses
  4. Fats of Dils

VI. Feed Analysis Information

  A. Sources

    1. Feed tables
    2. Commercial feed tag
    3. From a commercial feed laboratory, testing a sample of your feed

  B. This information can be used:

    1. In selecting feeds for rations
    2. In balancing animal rations
    3. In preparing daily feed requirements
    4. To help in determining feed quality

VII. Published Feed Tables (TM 5)

  A. Contain average composition information on most feedstuffs

  B. Prepared by the National Research Council (NRC) or other sources

  C. Can be used for ration formulation

VIII. The Commercial Feed Tag (TM 6)

  A. Guaranteed analysis

    1. Crude protein - percent
    2. Crude fat - percent
    3. Crude fiber - percent

INFORMATION SHEET

- B. Ingredients listed in descending order of quantity
- C. Net weight of the feed
- D. Any precautions concerning any drugs or non-protein nitrogen contained in the feed
- E. Directions for use
- F. Brand name and product name
- G. Name and mailing address of manufacturer

IX. Factors Affecting Feed Quality

- A. Roughages
  - 1. Maturity when harvested - late maturity lowers quality
  - 2. Proper curing and storage
  - 3. Rain damages cut hay
- B. Grain
  - 1. Storage
    - a. Improper moisture can trigger heating, mold, and sprouting of grain
    - b. Long term storage (3-10 yrs) lowers quality
  - 2. Harvesting
    - a. Improper machine adjustments can damage grain kernels
    - b. Harvesting before ripe lowers quality
  - 3. Weather
    - a. An early frost can lower overall feeding value

X. Methods of Determining Feed Quality

- A. Physical
  - 1. Looking at feed
  - 2. Smelling feed

INFORMATION SHEET

   3. Checking its test weight

B. Chemical

   1. Analysis by a laboratory to give the exact nutrient content

   2. Analysis for toxic compounds

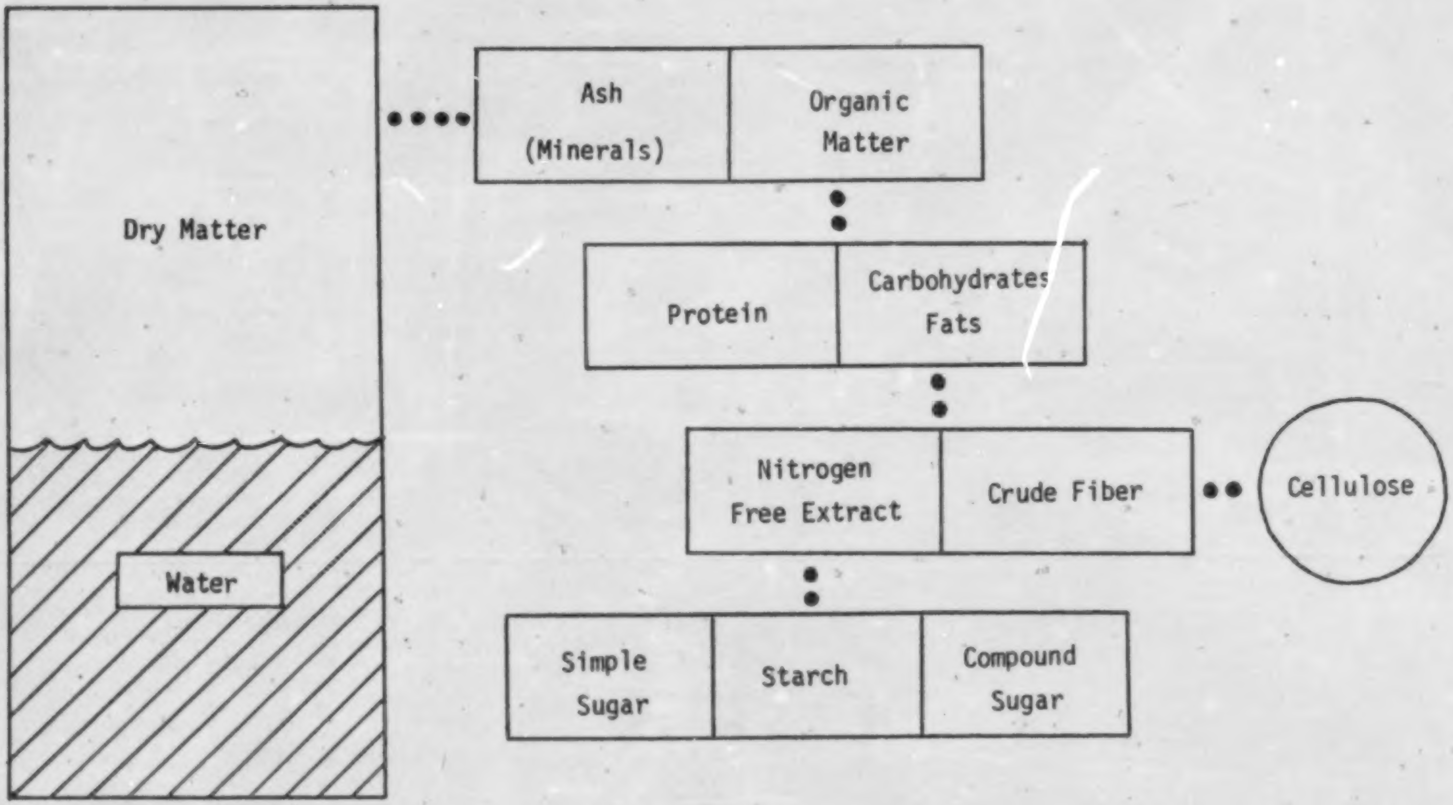
C. Biological - feeding trials

   1. Tests for palatibility

   2. Measures actual digestibility of feed

   3. Actual animal performance from given feed can be recorded

FEED COMPOSITION



Dry Matter

Water

Ash (Minerals)

Organic Matter

Protein

Carbohydrates Fats

Nitrogen Free Extract

Crude Fiber

Cellulose

Simple Sugar

Starch

Compound Sugar

TM 1

SC U3-13

CLASSIFICATION OF ROUGHAGES

GREEN ROUGHAGES

- Roots
- Tubers
- Grasses—
  - Pasture
  - Greenchop

DRY ROUGHAGES

- Hays—
  - Grass and Legume
- Hulls—
  - Peanut and Cottonseed
- Straw—
  - Oat, Wheat, Barley, and Rice

SILAGE

- Corn
- Sorghum
- Grass

CLASSIFICATION OF CONCENTRATES

OIL MEALS

Soybean
Cottonseed
Linseed
Peanut

MOLASSES

Cane
Beet

GRAIN BY-PRODUCTS

Wheat bran
Wheat standard middlings

ANIMAL PRODUCTS

Meat scraps
Tankage
Fish meal
Dried dairy products

GRAINS

Barley
Wheat
Corn
Milo
Oats

CLASSIFICATION OF SUPPLEMENT FEEDS

MINERAL SUPPLEMENTS

Fed Free Choice

- --Mixed with salt
- --Fed beside salt

Premixes

- --Mixed in feed

Common Supplements

- --Salt
- --Dolomitic limestone
- --Limestone
- --Deflourinated rock phosphate

PROTEIN SUPPLEMENTS

Plant Sources

- --By-products
- --Oilseed meals

Animal Sources

- --Meat by-products
- --Milk by-products
- --Blood meal

NPN

- --Urea
- --Ammonia

Specific Amino Acids

- --Mixed with feed

VITAMIN SUPPLEMENTS

Available Forms

- --Premixes
- --Injectable

Sources

- --Natrual cultures
- --Synthetic

SUPPLEMENTAL ENERGY SOURCES

Feed Grains

Milling By-products

- --Molasses

Fats and Oils

- --Tallows
- --Greases

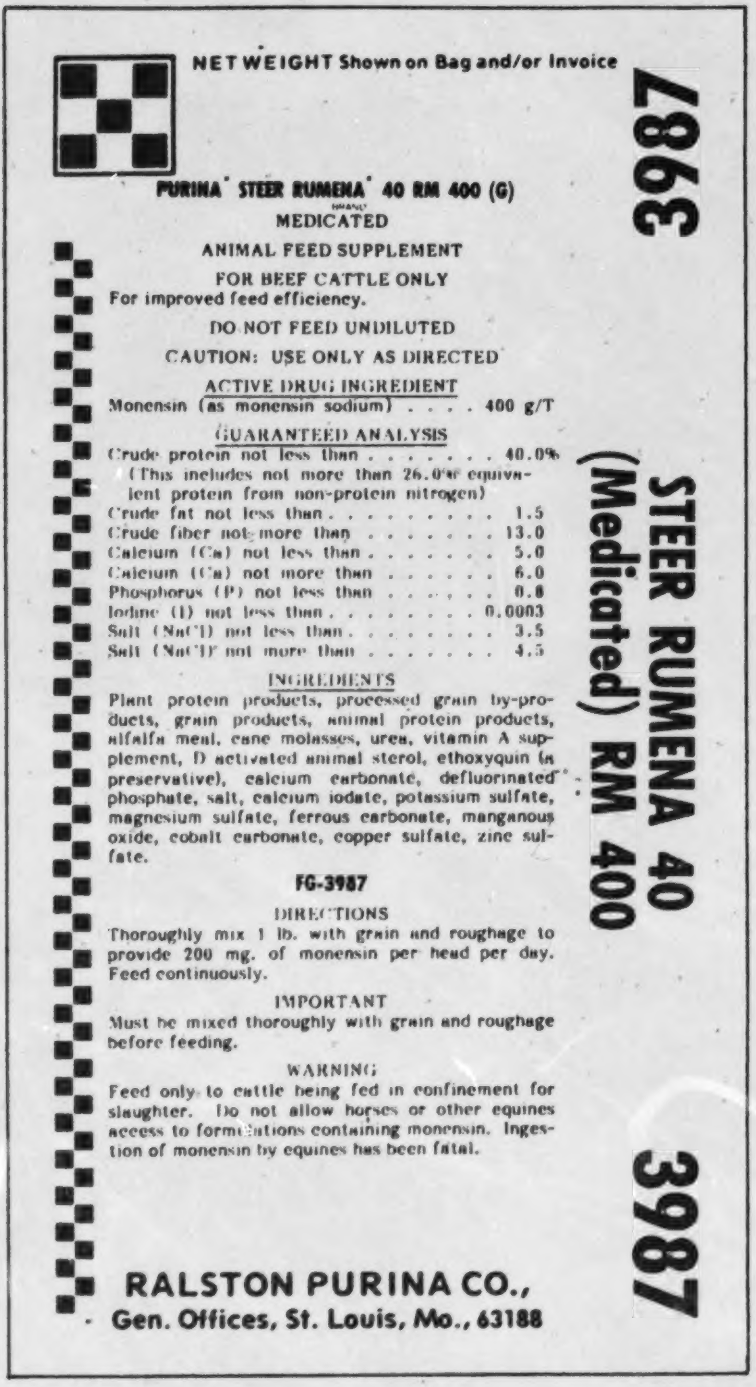
TM 4

SC U3-16

TABLE 1 Average Composition of Some Feeds

	DRY MATTER %	DIG. PROTEIN %	TDN %	FIBER %	Ca %	P %	LYSINE %
Legume hays:							
Alfalfa, average	88	11	50	28	1.6	.26	--
Soybean, good	88	10	49	28	.9	.24	--
Grass hays:							
Bromegrass	88	5	49	28	.4	.28	--
Oats	88	5	53	28	.3	.24	--
Prairie, western, mature	92	1	47	32	.4	.12	--
Timothy, average	88	3	49	30	.2	.19	--
Wheat	90	3	47	26	.1	.18	--
Silages:							
Alfalfa, wilted	36	4	21	11	.5	.12	--
Barley	25	1	13	9	.1	.08	--
Corn, good	27	1	20	7	.1	.07	--
Sudan	26	2	15	9	.1	.04	--
Cereal residues:							
Corn cobs, ground	90	0	46	32	.1	.04	--
Corn fodder, medium, in H_2O	83	3	54	22	.2	.14	--
Corn stover, medium, in H_2O	80	2	46	27	.4	.08	--
Cottonseed hulls	91	0	44	46	.1	.06	--
Oat straw	90	1	45	36	.3	.10	--
Wheat straw	90	0	41	37	.2	.08	--
Pasture:							
Blue grass	31	4	19	8	.2	.13	--
Orchard grass	24	2	16	6	.1	.12	--
Wheat	20	4	13	4	.1	.08	--
Alfalfa brome	22	3	20	7	.3	.07	--
Concentrates:							
Barley, 12% CP (crude protein)	90	9	75	--	.09	.33	0.4
Milo, 10% CP	89	8	80	--	.03	.28	0.1
Corn, 9% CP	85	7	80	--	.02	.27	0.2
Meat meal	95	45	67	--	8.5	4.2	4
Soybean oil meal, 41%	90	37	78	--	.26	.60	2.7
Bone meal	--	--	--	--	32	14	--
Prot. supp., 40%	90	40	80	--	3	.9	3

COMMERCIAL FEED TAG



NET WEIGHT Shown on Bag and/or Invoice

PURINA® STEER RUMENA® 40 RM 400 (G)
BRAND

MEDICATED

ANIMAL FEED SUPPLEMENT

FOR BEEF CATTLE ONLY

For improved feed efficiency.

DO NOT FEED UNDILUTED

CAUTION: USE ONLY AS DIRECTED

ACTIVE DRUG INGREDIENT

Monensin (as monensin sodium) . . . . 400 g/T

GUARANTEED ANALYSIS

Crude protein not less than	40.0%
(This includes not more than 26.0% equivalent protein from non-protein nitrogen)	
Crude fat not less than	1.5
Crude fiber not more than	13.0
Calcium (Ca) not less than	5.0
Calcium (Ca) not more than	6.0
Phosphorus (P) not less than	0.8
Iodine (I) not less than	0.0003
Salt (NaCl) not less than	3.5
Salt (NaCl) not more than	4.5

INGREDIENTS

Plant protein products, processed grain by-products, grain products, animal protein products, alfalfa meal, cane molasses, urea, vitamin A supplement, D activated animal sterol, ethoxyquin (a preservative), calcium carbonate, defluorinated phosphate, salt, calcium iodate, potassium sulfate, magnesium sulfate, ferrous carbonate, manganous oxide, cobalt carbonate, copper sulfate, zinc sulfate.

FG-3987

DIRECTIONS

Thoroughly mix 1 lb. with grain and roughage to provide 200 mg. of monensin per head per day. Feed continuously.

IMPORTANT

Must be mixed thoroughly with grain and roughage before feeding.

WARNING

Feed only to cattle being fed in confinement for slaughter. Do not allow horses or other equines access to formulations containing monensin. Ingestion of monensin by equines has been fatal.

RALSTON PURINA CO.,
Gen. Offices, St. Louis, Mo., 63188

3987

STEER RUMENA 40
(Medicated) RM 400

3987

COMMERCIAL LABORATORY
FEED ANALYSIS FORM V

ANALYSIS REPORT BY KELTNER LABORATORIES INCORPORATED

Date Sample Received: 3 - 19 - 81
Client: FARMER X
Clients Sample I. D.: HAY
Laboratory Number: 78-3-1

Keltner Laboratories, Inc.
P. O. Box 1102
1568 Hayes Drive
Manhattan, Kansas 66502
Telephone (913) 776-5030

	As Received		Dry Basis	
Moisture (Convection Oven)	14.62	%	0.00	%
Dry Matter	85.38	%	100.00	%
Digestible Protein (Heat Damage Test)		%		%
Crude Protein	2.89	%	3.38	%
Crude Fat (Ether Extract)		%		%
Crude Fiber	32.53	%	38.11	%
Acid Detergent Fiber (ADF)	42.42	%	49.68	%
Neutral Detergent Fiber (NDF)		%		%
Ash		%		%
Net Energy for Maintenance		Mcal/lb		Mcal/lb
Net Energy for Gain		Mcal/lb		Mcal/lb
Net Energy for Lactation	.33	Mcal/lb	.39	Mcal/LB
Total Digestible Nutrients (TDN)	44.41	%	52.01	%
Nitrogen Free Extract (NFE)		%		%
Sodium		%		%
Calcium	0.84	%	0.99	%
Phosphorus	0.18	%	0.21	%
Magnesium		%		%
Potassium		%		%
Selenium		ppm		ppm
Sulfur		ppm		ppm
Iron		ppm		ppm
Copper		ppm		ppm
Zinc		ppm		ppm
Manganese		ppm		ppm
Molybdenum		ppm		ppm
Aluminum		ppm		ppm
Boron		ppm		ppm
Nitrate		ppm		ppm
Prussic Acid (Hydrocyanic Acid)		ppm		ppm
Heat Damage Protein		%		%
Available Protein		%		%
Non Protein Nitrogen		%		%
Fat (Acid Hydrolysis)		%		%
Moisture (Vacuum Oven)		%		%

SIGNATURE OF RELEASING AUTHORITY ....

NUTRITION

UNIT III

TEST

1. Define the following terms:

   a. Silage -

   b. Supplement feed -

   c. Palatibility -

   d. Concentrate feed -

   e. Medicated feed -

   f. Complete feed -

   g. Fiber -

   h. Roughage -

2. Show an understanding of feed composition by indicating the following statements as true or false. (Circle the correct answer)

   a. T F Feed grains are approximately 10-15% water

   b. T F Crude fiber is the portion of feed most easily digested

   c. T F Crude fiber is made up primarily of protein

   d. T F Freezing is the third step in determining dry matter

   e. T F When determining feed dry matter the difference in the weight before and after heating is the water fraction

   f. T F The carbohydrate portion of feed includes fiber, starches, and sugars

TEST

3. Place an "X" before each feed characteristic which describes a roughage.

_____a. Fed primarily to ruminants and horses

_____b. Are stored in elevators

_____c. High in fiber

_____d. Low in fiber

_____e. Very high in digestible Energy

_____f. Very expensive

_____g. Commonly fed to swine

_____h. Can be produced on the farm

_____i. Poisonous to cattle

4. Select the correct feedstuff to fill in the outline.

A. Grains

1. ____________
2. ____________

B. Grain by-products

1. ____________
2. ____________

C. Molasses

1. ____________
2. ____________

D. Oil Meals

1. ____________
2. ____________

E. Animal Products

1. ____________
2. ____________

Feedstuff

barley, wheat bran, meat scraps, cane, hominey feed, milo, beet, tankage, soybean meal, linseed meal.

5. Name the three types of supplement feeds

a. ____________________________

b. ____________________________

c. ____________________________

TEST

6. a. List three sources of feed analysis information.

1. ____________________________

2. ____________________________

3. ____________________________

b. How is analysis information used by the farmer?

7. Using the table below, arrange the listed grains in descending order according to their digestible energy content

	GROSS ENERGY[1] Kcal/lb	DIGESTIBLE ENERGY[1] Kcal/lb for Ruminants	CRUDE FIBER[2] % Cellulose (Approx.)
Barley	2,086	1,595	5.6
Corn[3]	2,524	1,964	2.1
Milo	1,995	1,888	2.2
Oats	2,138	1,348	12.4
Rye	1.767	1,618	2.2
Wheat	2,043	1,730	3.4

1.________________________ (highest energy)

2.________________________

3.________________________

4.________________________

5.________________________

6.________________________ (lowest energy)

8. List the three items of feed analysis information that must be included on a feed tag.

a.________________________

b.________________________

c.________________________

TEST

9. Identify four factors that can lower feed quality by placing an "X" in the correct blanks below.

______a. Storing at a high moisture content

______b. Harvesting grain when ripe

______c. Harvesting hay when ripe

______d. Long term storage

______e. Storing feed during the winter

______f. Weather

10. Name the three methods of determining feed quality

a. ______________________________

b. ______________________________

c. ______________________________

NUTRITION

UNIT III

TEST

1. a. A feed crop stored without drying by fermentation.
   b. Anything which is added to the feed to add a specific nutrient.
   c. The taste or animal acceptability to a feed.
   d. The feeds which have a high proportion of digestible nutrients and not much fiber.
   e. Any feed which contains drugs.
   f. A feed which meets all of an animals nutritional requirements, except water.
   g. The tough part of feed which is high in cellulose and low in digestibility.
   h. The feeds high in fiber and low in net energy, example - hay, pasture and crop residues.

2. a. T
   b. F
   c. F
   d. F
   e. T
   f. T

3. Those that should be checked are;
   a. c. h.

4. A. Grains
      1. Barley
      2. Oats
      3. Milo
   B. Grain by-products
      1. Wheat bran
      2. Hominey feed
   C. Molasses
      1. Beet
      2. Cane
   D. Oil meals
      1. Linseed
      2. Soybean
   E. Animal products
      1. Tankage
      2. Meat scraps

5. a. Vitamin
   b. Mineral
   c. Protein

6. a. 1. Commercial feed tag
      2. Feed tag
      3. NRC feed tables
   b. To calculate feed rations, or to select the proper feed to include in a ration.

ANSWERS TO TEST

7. 1. Corn
   2. Milo
   3. Wheat
   4. Rye
   5. Barley
   6. Oats

8. a. Minimum crude protein (percentage)
   b. Maximum crude fiber (percentage)
   c. Minimum crude fat (percentage)

9. Those that should be checked are:
   a. c. d. f.

10. a. Physical
    b. Chemical analysis
    c. Biological tests (feed trials)

NUTRITION

UNIT IV

RATION FORMULATION

TERMINAL OBJECTIVE

Upon completion of this unit, the student will be able to recognize animal nutritional requirements, select appropriate feedstuffs, and develop complete rations to meet the determined nutritional requirements. This objective will be considered achieved by scoring at least eighty-five percent on the test.

SPECIFIC OBJECTIVES

After completion of this unit, the student will be able to:

1. Match terms dealing with ration formulation to their correct definition.
2. List four characteristics of a good ration.
3. List four factors which may affect the proper formulation of an animal ration.
4. Identify 10 common feeds and indicate the primary nutrient which each supplies.
5. List two types of rations.
6. List the two methods for feeding rations.
7. Select from a list of six, four factors that may affect feed consumption.
8. Using mathematical methods, convert pound nutrient requirements to percentage figures.
9. Identify and describe two feed processing methods used for each of the following animals: a) cattle b) swine c) horse
10. Balance rations using the Pearson square method to meet minimum dry matter, TDN, and protein requirements for beef animals.
11. Formulate a bulk feed mixture to be fed to swine.
12. Select the most economical sources of nutrients.

NUTRITION

UNIT IV

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheet
2. Provide students with Information and Assignment Sheets
3. Discuss Terminal and Specific Objectives
4. Discuss Information and Assignment Sheets
5. Assign and assist in practice of the skills listed on the Assignment Sheets
6. Give Test

Students:

1. Read Objectives
2. Study Information Sheets
3. Complete Assignment Sheets and turn in to instructor
4. Take Test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information Sheets
3. Transparency Master

   TM 1 - Pearson Square

4. Assignment Sheet Supplement
5. Assignment Sheets

   #1 - Balancing Rations Using Pearsons Square

   #2 - Working a Sample Ration for a Gestating Sow

   #3 - Working a Sample Ration for a Fattening Beef

   #4 - Balancing a Ration for Your Own Use

INSTRUCTIONAL MATERIALS

6. Answers to Assignment Sheets
7. Test
8. Answers to Test

References:

1. Feeds and Nutrition, M.E. Ensminger and C.G. Olentine, Jr., Ensminger Publishing Co., Clovis, California, 1978.
2. Livestock Feeds and Feeding, D.C. Church, Published by D.C. Church, Corvallis, Oregon, 1977.
3. Working in Animal Science, Paul Peterson, Allen C. Christensen and Edward A. Nelson, McGraw-Hill Book Company, San Francisco, California, 1978.
4. Kansas Cattle Feeders Handbook, Cooperative Extension Service, Kansas State University, Manhattan, Kansas.
5. Park Industry Handbook, Cooperative Extension Service, Kansas State University, Manhattan, Kansas.
6. Feeds, Farmland Industries, Inc., Kansas City, Missouri, 1980.

NUTRITION

UNIT IV

INFORMATION SHEET

I. Terms and Definitions

   A. Ration - Feed necessary for a given animal for 24 hours

   B. Balanced ration - Ration which supplies all the necessary nutrients in proper proportions for a period of 24 hours

   C. Nutrient - Single class of food that aids in support of life

   D. Digestible nutrient - That portion of a nutrient which may be digested and absorbed by the animal

   E. TDN - Total Digestable Nutrients, proportion of a feed which supplies energy

   F. Dry matter - A term used to refer to feed when water content is not included

   G. Bloom - Healthy appearence indicating that the animal is doing well on feed

   H. Pearson's square - A simple way of preparing a mixture from two ingredients to obtain a set percentage of each additive

   I. Maintenance ration - A ration which meets the minimum needs of the animal for life support

   J. A growing ration - A ration to meet the animal's needs during rapid growth

   K. Finishing ration - A ration formulated to supply high energy during the final growing stage

   L. Least cost - The most economical feed source or combination of feedstuffs

II. Characteristics of a Balanced Ration

   A. Contains all nutrients needed by the animal

      1. Energy

      2. Protein

      3. Vitamins

      4. Minerals

      5. Water must be available to the animal

INFORMATION SHEET

- B. Contains nutrients in correct proportions
  - 1. Energy
    - a. Excess leads to fattening
    - b. Deficiency allows loss of condition
  - 2. Protein - Must be correct percentage of total feed
  - 3. Vitamins - Must be sufficient
  - 4. Minerals
    - a. Ca-P must be 2to 1 ratio
    - b. Salt .5-.7% of ration
    - c. Some excess can be toxic, example: Selenium, lead and mercury
- C. Palatability
- D. Economically feasible

III. Information Needed to Formulate a Balanced Ration

- A. Nutrient requirements of animals to be fed
  - 1. May vary according to time of year
  - 2. May vary as to production level (dairy)
  - 3. Stage of life, example: gestation, dry
- B. Feedstuffs available
- C. Type of ration needed
  - 1. Maintenance ration
  - 2. Growing ration
  - 3. Finishing ration
  - 4. High roughage vs. high concentrate
- D. Minimum or expected feed consumption
  - 1. May vary according to production level, health or animal size

IV. Nutrients Supplied in Common Feedstuffs

- A. Grains
  - 1. High in TDN (energy)
  - 2. Usually need protein supplement
  - 3. Common grains: milo, corn, wheat, oats, rye, barley

INFORMATION SHEET

B. Oil seed meals

  1. High in TDN

  2. High in protein

  3. Common meals: soybean, cottonseed, flax seed, peanut, fish

C. Meat by-products

  1. High in protein

  2. Fat high in TDN only

  3. Common feedstuffs: tankage, meat and bone meal, meat scraps, animal fat

D. Dairy by-products

  1. High in protein

  2. TDN

  3. Calcium

  4. Common dairy products: whey, dry milk

E. Roughages

  1. Energy for ruminants

  2. Bulk for rations (fiber)

  3. Alfalfa supplies protein and calcium

  4. Common roughages: grass hay, legumes, crop residues, silages, beet pulp, bran, (straw, stover, etc.)

F. Miscellaneous

  1. Sorghum - high in TDN

  2. Millfeeds - TDN and protein

V. Types of Rations

A. Complete ration - Contain all of required nutrients

INFORMATION SHEET

- B. Component ration
  - 1. Silage in bunk with hay free choice
  - 2. Supplemental grain - Fed to higher producing dairy cows

VI. Methods of Feeding

- A. Free choice feeding or Ad lib
- B. Hand feeding
  - 1. Once a day
  - 2. Twice a day

VII. Factors Effecting Feed Consumption

- A. Palatability of ration
  - 1. Agreeability to each species taste
  - 2. Feeding at high amounts depresses consumption
  - 3. Salt can supress consumption
  - 4. Finely ground rations are less palatable to cattle
- B. Level of production
  - 1. Lbs. of milk per day
  - 2. Rate of gain
- C. Health of the animal
  - 1. Presense of some parasites increases consumption
  - 2. Depression of feed intake is a common symptom of illness
- D. Weather
  - 1. Hot weather lowers intake
  - 2. Cold weather can increase intake
- E. Body weight of animals - Larger animals have higher maintainence requirements
- F. Heridity - Some animals just eat more than others

INFORMATION SHEET

VIII. Nutrient Requirements for Breeding Stock

A. Nutrient requirements for cow and gilt

Animal	Weight lb.	Requirements DM lb.	Protein lb.	TDN lb.
Bred Cow	1100	17.9	1.083	10.32
Bred Gilt	250	4.9	0.686	3.871

B. Calculating nutrient requirements as a percentage of the ration from information in daily minimum allowances

1. Divide individual nutrient need by total dry matter and multiply by 100

2. Example

a. Cow protein requirement

$$\frac{1.083 \text{ lb.}}{17.9 \text{ lb.}} \quad X \quad 100 = 6\%$$

b. Gilt TDN requirement

$$\frac{3.871 \text{ lb.}}{4.9 \text{ lb.}} \quad X \quad 100 = 79\%$$

C. This skill is needed in ration formulation when working with the Pearson Square Method of balancing.

IX. Feed Processing

A. Types of processing methods

1. Conventional methods

a. Grinding

b. Dry rolling

c. Steam rolling

d. Pelleting

INFORMATION SHEET

2. Modern methods
    a. Steam flaking
    b. Pressure flaking
    c. Popping
    d. Micronizing
    e. Extruding

B. Feed processing for ruminants
    1. Done primarily to improve digestibility and feed efficiency
    2. Breaking of tough feed coat needed (some grains)
    3. Allows better mixing of complete rations
    4. Heating yields slight increases in utilization of starches for ruminants
    5. Common processing methods
        a. Grinding - most common (see note below)
        b. Dry rolling or cracking
        c. Popping and micronizing
        d. Steam rolled
        e. Pelleting

        (Note: Dairy cattle may show lowering of butterfat test if roughage is finely ground)

C. Feed processing for monogastrics
    1. Improves digestibility and feed efficiency
    2. Swine
        a. Grinding - most common
        b. Pelleting - slight increase in feed efficiency
        c. Crumblized - rolled pellets

INFORMATION SHEET

3. Horses
   a. Feed must not be dusty
   b. Rolling
   c. Cracking
   d. Horses will consume more pelleted hay as long hay
   e. Baled hay - most common

X. Balancing Rations for DM, TDN, and DP
   A. Figure animals' requirements (Table 2)
   B. Select feeds to be used and determine their nutrient content (Table 1)
   C. Formulate a balanced ration using the Pearson Square Method, (TM 1) using the feeds that have been selected (other calculation methods may be used)
   D. Compare formulated ration nutrient content with animal requirements

Example: 400 pound fattening beef animal

	Dry Matter (DM) %	Dig. Protein(DP) %	Total Digestible Nutrient (TDN)
Corn	.850	.075	.800
(7# fed)	7	7	7
	5.95	.525	5.60
Cottonseed meal	.91	.333	.652
(2# fed)	2	2	2
	1.82	.666	1.304
Cottonseed hulls	.908	0	.437
(5# fed)	5	5	5
	4.540	0	2.18
7 lbs. Corn	5.95	.525	5.60
2 lbs. Cottonseed meal	1.82	.666	1.30
5 lbs. Cottonseed hulls	4.54	.000	2.18
Feeds Total Nutrient Content	12.31	1.191	9.08
Animal's Requirements	9.6-12.1	1.05-1.15	7.4-8.6
	+ .2	+.04	+.48

INFORMATION SHEET

XI. Formulating Bulk-Rations (TM 1)
Refer to SA U4-13

- A. All nutrient requirements must be on a percentage basis
  - 1. Example: Requirements of a ration for a 100 pound pig
    - a. TDN - 83%
    - b. Dig. Protein - 12.3%
- B. Use Pearson Square or other methods
- C. Formulas can be used with any amount of feed

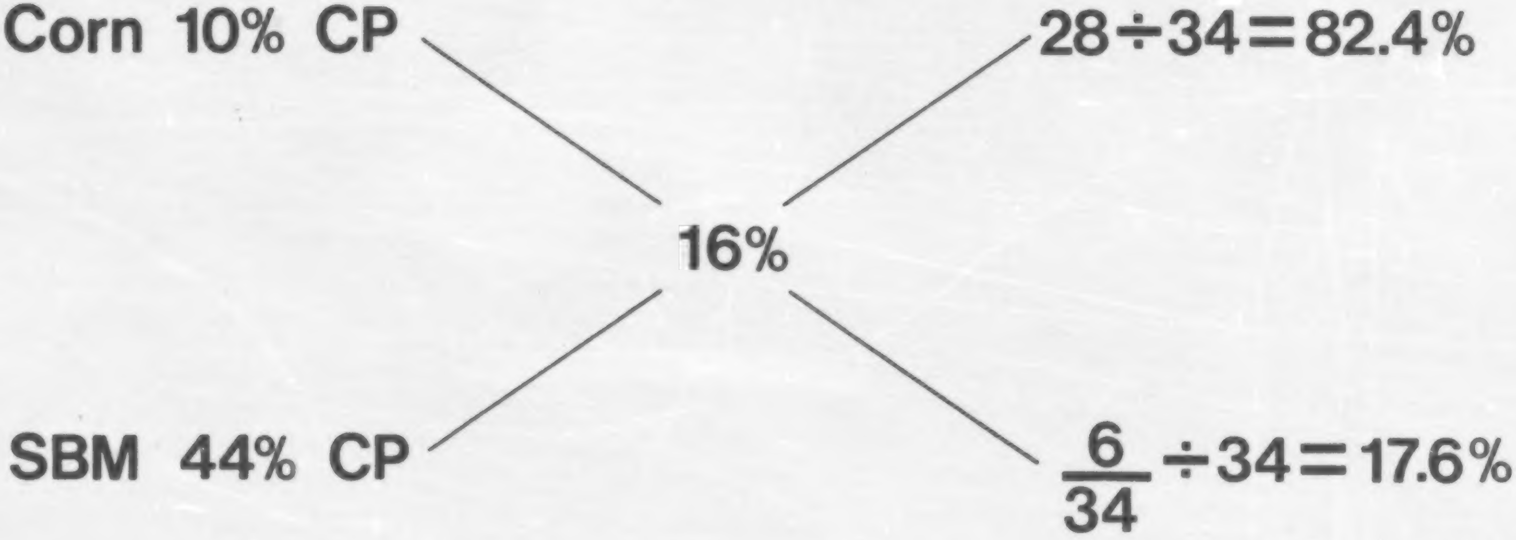
XII. Determining the Value of Feed

- A. Cost per pound of nutrient
  - 1. Determine amount of nutrient in feed
  - 2. Divide selling price of feeds by nutrient amount
- B. Cost of protein in corn and soybean meal
  - 1.

	Cost	Protein Content
Corn	$3.60 per bushel	9.1%
SBM	$240.00 per ton	41.2%

  - 2. Cost of protein in corn
    - a. Cost of protein in corn is equivalent to cost per pound divided by 0.091
    - b. Example: $\frac{\$3.60}{56 \text{ lb.}} \div 0.091 = \$.71/\text{lb.}$
  - 3. Cost of protein in SBM
    - a. Cost of protein in SBM is equivalent to cost per pound divided by 0.412
    - b. Example: $\frac{\$240.00}{2000} \div .412 = \$0.29/\text{lb.}$

PEARSON SQUARE



Corn 10% CP

$28 \div 34 = 82.4\%$

16%

SBM 44% CP

$\frac{6}{34} \div 34 = 17.6\%$

NUTRITION

UNIT IV

ASSIGNMENT SHEET SUPPLEMENT

TABLE 1 Average Composition of Some Feeds

	DRY MATTER %	DIG. PROTEIN %	TDN %	FIBER %	Ca %	P %	LYSINE %
Legume hays:							
Alfalfa, average	88	11	50	28	1.6	.26	--
Soybean, good	88	10	49	28	.9	.24	--
Grass hays:							
Bromegrass	88	5	49	28	.4	.28	--
Oats	88	5	53	28	.3	.24	--
Prairie, western, mature	92	1	47	32	.4	.12	--
Timothy, average	88	3	49	30	.2	.19	--
Wheat	90	3	47	26	.1	.18	--
Silages:							
Alfalfa, wilted	36	4	21	11	.5	.12	--
Barley	25	1	13	9	.1	.08	--
Corn, good	27	1	20	7	.1	.07	--
Sudan	26	2	15	9	.1	.04	--
Cereal residues:							
Corn cobs, ground	90	0	46	32	.1	.04	--
Corn fodder, medium, in H_2O	83	3	54	22	.2	.14	--
Corn stover, medium, in H_2O	80	2	46	27	.4	.08	--
Cottonseed hulls	91	0	44	46	.1	.06	--
Oat straw	90	1	45	36	.3	.10	--
Wheat straw	90	0	41	37	.2	.08	--
Pasture:							
Blue grass	31	4	19	8	.2	.13	--
Orchard grass	24	2	16	6	.1	.12	--
Wheat	20	4	13	4	.1	.08	--
Alfalfa brome	22	3	20	7	.3	.07	--
Concentrates:							
Barley, 12% CP (crude protein)	90	9	75	--	.09	.33	0.4
Milo, 10% CP	89	8	80	--	.03	.28	0.1
Corn, 9% CP	85	7	80	--	.02	.27	0.2
Meat meal	95	45	67	--	8.5	4.2	4
Soybean oil meal, 41%	90	37	78	--	.26	.60	2.7
Bone meal	--	--	--	--	32	14	--
Prot. supp., 40%	90	40	80	--	3	.9	3

TABLE 2 Morrison and National Research Council Nutrient Requirements

Requirements	DRY MATTER lb	DIG. PROTEIN lb	CP lb	TDN lb	Ca lb	P lb	LYSINE %
1000 lb dairy cow, maint.		.62	--	7.5	.022	.022	--
45 lb 4% fat milk		1.80	--	12.1	.088	.068	--
Total		2.42	--	19.6	.110	.090	--
900 lb steer	21.5	1.80	--	17.0	.044	.044	--
1000 lb beef cow	17	.75	--	8.0	.044	.037	--
100 lb pig	4.8	.59	.69	4.0	.024	.017	.70
100 lb ram lamb	3.0	.23	--	2.0	.009	.008	--
100 lb calf	1.5	.35	--	1.8	.015	.011	.65
400 lb pregnant sow	6.0	.75	1.0	4.5	.031	.025	--

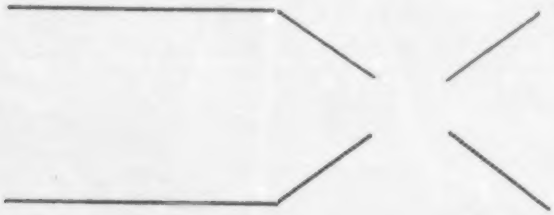
Adapted from Morrison, Feeds and Feeding, and National Research Council (NRC)

NUTRITION

UNIT IV

ASSIGNMENT SHEET #1: Balancing Rations Using Pearson's Square

Determine the total parts needed in a 16% ration using 8.5% DP milo and 41.0% cotton seed meal. Show your work.



NUTRITION

UNIT IV

ASSIGNMENT SHEET #2: Working a Sample Ration for a Gestating Sow

Balance a sample ration for a 400 pound pregnant sow for Dry Matter and Crude Protein. Use Assignment Sheet Supplement for reference.

Animal Requirements:	DM	DP	TDN

Choose your own feeds: (Suggestion -- one grain, one protein supplement)	DM	DP	TDN

NUTRITION

UNIT IV

ASSIGNMENT SHEET #3: Working a Sample Ration for a Fattening Beef Animal

Balance a sample ration for an 850 pound beef fattening animal for DM, TDN, and DP. Use Assignment Sheet Supplement for reference. (Calculations are on DM basis.)

Animal Requirements:	DM	DP	TDN	(% of DM)

Use the following feeds:	DM	DP	TDN	(% of DM)
Milo				
Corn Silage				
Soybean Meal				

NUTRITION

UNIT IV

ASSIGNMENT SHEET #4: Balancing a Ration for Your Own Use

Balance a useable ration for an animal of your choice for DM, DP, and TDN. Use the Assignment Sheet Supplement or other analysis source for reference.

Animal Selected:

Animal Requirements: DM DP TDN

Use three locally available feeds: DM DP TDN

NUTRITION

UNIT IV

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #1

25.0 parts of milo
7.5 parts of cotton seed meal
32.5 total parts

Assignment Sheets #2, #3, and #4

Complete to the satisfaction of the instructor

NUTRITION

UNIT IV

TEST

1. Match the following terms with their appropriate definitions on the right.

_____a. Digestible nutrients

_____b. Balanced ration

_____c. Maintainence ration

_____d. TDN

_____e. Dry matter

_____f. Finishing ration

1. Energy portion of feed
2. High energy ration
3. Refers to feed minus water
4. Portion of feed which is actually absorbed
5. Minimum energy ration
6. Ration containing all essential nutrients in proper proportions.

2. Indicate four characteristics of a ration by judging the following statements as true or false. (Circle the correct answer)

a. T F A properly balanced swine ration meets all mineral requirements.

b. T F When balancing a sheep ration, protein content need not be considered.

c. T F A properly balanced horse ration always includes an excess of energy.

d. T F A special ratio may exist between two or more components of a balanced ration.

3. Recognize the four most important factors which can effect the formulation of a balanced animal ration by placing an "X" in the blank beside the appropriate ones.

_____a. The animal's color

_____b. The taste of the feed

_____c. The animal's value

_____d. Nutrient sources available

_____e. The time of year

_____f. The number of animals to be fed

_____g. How much it will eat

_____h. Size of the feed bunk

TEST

4. Label the following feedstuffs according to the primary nutrient or nutrients they supply by placing the appropriate letter(s) in the corresponding blank.

P - Protein
F - Fiber
E - Energy
M - Minerals

_____a. Corn

_____b. Wheat

_____c. Alfalfa hay

_____d. Soybean oil meal

_____e. Prairie hay

_____f. Sawdust

_____g. Sorghum silage

_____h. Meat and bone meal

_____i. Molasses

_____j. Whey

5. List two types of rations that can be fed.

a. ______________________________ b. ______________________________

6. List the two methods for feeding rations

a. ______________________________ b. ______________________________

7. Select from the list at right the four factors which may LOWER feed consumption. Place the corresponding number in the appropriate blank below.

_____a.

_____b.

_____c.

_____d.

1. Increase in milk production
2. Hot weather
3. Illness
4. Increase in rate of gain
5. High amount of salt in ration
6. Old age

8. A 100 pound calf needs 1.5 lbs. of dry matter and .35 lbs. of protein. Calculate the percentage of protein that must be in the calves' daily ration. (Show your work)

TEST

9. Balance a ration for a 1000 lb. steer gaining 3 lbs/day. Use the Pearson Square method.

	DM	TDN(%)	CF(%)
Animal Requirements	21.6 lbs	22	1.5
Alfalfa hay	88%	50	15.5
Cracked corn	85%	80	9.5

Corn _____ lb.

Alfalfa hay _____ lb.

10. Formulate a 2000 lb. mixture of corn and soybean meal to be fed free choice to a 100 lb. growing pig.

	DM	DP	TDN
Animal Requirements	4.8 lb.	.59 lb	3.8 lb
Corn	90%	7%	80%
SBM	90%	41%	78%

Corn ________ lb.

SBM ________ lb.

Total 2000 lb.

TEST

11. Select the most economical source of nutrients by circling the letter corresponding to the best answer to the following questions.

A. A ration deficient in protein only.
Which feed would most economicly meet the need?

a. Molasses - $4.25/cwt. 4% CP

b. Barley rolled - $8.25/cwt. 13% CP

c. Whey dried - $8.25/cwt. 16% CP

d. Soybean meal - $12.25/cwt. 47% CP

B. Choose the most economical ruminant energy source.

a. Corn silage - $3.60/cwt. 70% TDN

b. Beet pulp - $7.00/cwt. 83% TDN

c. Corn ground - $9.25/cwt. 90% TDN

d. Urea - $17.50/cwt. -------

NUTRITION

UNIT IV

ANSWERS TO TEST

1. a. 4 d. 1
   b. 6 e. 3
   c. 5 f. 2

2. a. T c. F
   b. F d. T

3. Those that should be checked are:

   b. d. e. g.

4. a. E f. F

   b. E, P g. E, F

   c. (E), F, P, M h. M,P

   d. E, P i. E

   e. E, F j. P, E, M

5. a) Complete b) Component

6. a. Free choice or Ad Lib
   b. Hand fed

7. a. 2 c. 5 (any order)
   b. 3 d. 6

8. $\frac{.35}{1.5}$ X 100 = 23.3%

9. Corn - 19.8 lb. (dry matter basis)
   Alfalfa hay - 1.8 lb.

ANSWERS TO TEST

10. Corn - 84.4 or 1688 lb.
    SBM - 15.6 or 312 lb.

11. A. d.
    B. a.

NUTRITION

UNIT V

NUTRITIONAL MANAGEMENT

TERMINAL OBJECTIVE

Upon completion of this unit, the student will be aware of special nutritional management practices concerning individual programs and phases of dairy, beef, swine, horse, and sheep production.

SPECIFIC OBJECTIVES

After completion of this unit, the student will be able to:

1. Match terms associated with livestock nutrition practices with their correct definition
2. List four reasons for properly feeding the breeding herd
3. List two feeding management practices for the breeding herd during five reproduction phases
4. Describe three nutritional requirements of breeding males
5. Choose the correct feed rations to be fed during the three major growth phases of livestock
6. Select the best management practices to be applied in beef nutrition
7. List five nutritional management practices when feeding the dairy cow
8. List five nutritional management practices for feeding calves from birth to weaning
9. List two causes of malnutrition of the newborn pig and give a remedy for each
10. Recognize correct nutritional management practices for sheep production
11. Identify recommended feeding practices for horses

NUTRITION

UNIT V

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheet
2. Provide students with Information Sheets
3. Make Transparency
4. Discuss Terminal and Specific Objectives
5. Discuss Information Sheets
6. Give Test

Students:

1. Read Objectives
2. Study Information Sheets
3. Take Test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information Sheets
3. Transparency Master

   TM 1 - CALF NUTRITIONAL REQUIREMENTS

4. Test
5. Answers to Test

References:

1. Feeds and Nutrition, M.E. Ensminger and C.G. Olentine Jr., The Ensminger Publishing Company, Clovis, California, 1978.
2. Working in Animal Science, Paul Peterson, A.C. Christensen and E.A. Nelson, McGraw-Hill, San Francisco, California.
3. Livestock Feeds and Feeding, D.C. Church, O. and B. Books, Corvalls, Oregon, 1977.

INSTRUCTIONAL MATERIALS

4. Dairy Cattle: Principles, Practices, Problems, Profits, Bath, Dickinson, Tucker and Appleman, Lea and Febiger, 1978, Philadelphia, Pa.

Additional materials:

1. Pork Industry Handbook, Cooperative Extension Service, Kansas State University, Manhattan, Kansas.
2. Report of Progress 383, Agricultural Experiment Station publication on new research in cattle feedstuffs, Kansas State University, Manhattan, Kansas, May 1980.
3. Cow Herd Nutrition, Pamphlet C-582, 1977, Cooperative Extension Service, Kansas State University, Manhattan, Kansas.
4. Equine Feeding Tips, Leaflet L-429, 1976, Cooperative Extension Service, Kansas State University, Manhattan, Kansas.

NUTRITION

UNIT V

INFORMATION SHEET

I. Terms and Definitions

A. Rate of gain - The number of pounds, or additional body weight, an animal gains each day

B. Efficiency of gain - Feed efficiency, the amount of feed required to put on a given amount of gain

C. Gestation - The period of time between conception and parturition (birth)

D. Flushing - A practice of increasing the amount of grain fed to a female for two-three weeks prior to breeding to increase fertility

E. Creep feeding - The practice of providing supplemental feed to the young animal while it is nursing

F. Starter ration - The first solid ration an animal eats following nursing

G. Grower or stocker ration - A ration that supplies nutrients for efficient growth without allowing the animal to fatten

H. Finishing ration - The final, highest energy ration of a feedlot animal which allows the animal to deposit fat

I. NE milk - The amount of energy needed above the maintenance level to produce milk

J. Milk fever - A disorder of lactating animals resulting from low blood levels of calcium

K. Ketosis - A problem resulting from a low energy ration during high milk production, thus requiring the cow or sheep to draw excessively from body fat stores

L. Anemia - Low red blood cell count, commonly from iron deficiency

M. Colic - Abdominal pain, commonly referring to horses

N. Laxitive ration - Bulky ration, the stimulates rate of feed passage

II. Feeding the Female Breeding Herd

A. Importance of proper breeding herd nutrition

INFORMATION SHEET

1. Essential for optimum fertility
2. Produce more and stronger young (larger litters in swine)
3. Wean more pounds of calves, lambs, or pigs
4. A properly fed herd is a healthier herd
5. A proper ration should
    a. Provide energy for maintenance
    b. Provide energy for growing replacement animals
    c. Allow proper fetal development
    d. Encourage maximum milk production

III. A. Feeding during the dry or barren period

1. Sheep, swine, dairy cows
2. Body condition should be improved
3. Increase energy as breeding time nears
4. Prevent fattening

B. Feeding prior to and during breeding

1. Flushing - sheep and swine
    a. Swine - increases energy 20-25% 10-14 days prior to breeding
    b. Ewes - supply lush pasture or 1/2-3/4 of a pound of grain per day 2-3 weeks before breeding time
    c. Increases ovulation in swine and sheep (may increase lamb crop 15-20%)
2. Maintain a slightly increasing plane of nutrition through breeding

C. Gestation

1. Prevent fattening
2. First pregnancy animals - allow normal growth in addition to growth of fetus
3. Expected gains during gestation

INFORMATION SHEET

      a. Mature cow - 150 pounds
      b. Mature sow - 70 pounds
      c. Ewe - not available, TDN requirements 40% higher during last third of pregnancy

- D. Feeding before and after birth
  1. Swine - laxative ration, withhold feed 12 hours before and after farrowing
  2. Ewes - laxative ration, cool water (not cold)
  3. Cows - good hay ration
  4. Horses - limited hay 24 hours after parturition then laxative ration for 2-4 days
- E. Lactation
  1. High energy and balanced protein ration
  2. Good calcium source
  3. Convert to high energy ration slowly to prevent digestive upset and excessive milk production for the newborn

IV. Feeding the Breeding Males (rams, boars, bulls, and stallions)

- A. Feed to maintain condition
- B. After breeding feed to rebuild lost conditioning
- C. Prevent fattening
- D. Usually a larger allotment of the female ration
  1. Boars - 5-7 lbs. corn equivalent per day
  2. Bulls - legume hay free choice, small amounts of grain
  3. Rams - pasture adequate, supplement during breeding season
  4. Stallion - feed a balanced ration giving attention to protein, minerals, and vitamins

V. Feeding During Three Growth Stages

- A. Starter ration

INFORMATION SHEET

1. Pre-starter of early creep
    a. Supplement to milk
    b. Fed as early as possible
    c. Medicated and often pelleted
2. The starter or creep feed
    a. It is the conversion ration from milk to dry feed
    b. Should be well balanced and medicated
    c. Should be energy to promote growth
3. Management practices when using a creep
    a. Prevent buildup of stale feed
    b. Convert to new ration gradually
    c. A highly palatable and digestable ration is important

B. Growing ration

1. Used during period of maximum growth
    a. Swine - 40 lbs. until 175 lbs.
    b. Beef - 400-750 lbs. (stockers or feeders)
    c. Replacement heifers - weaning until mature
    d. Equine - weaning until two years
2. Ration type
    a. High energy roughage for ruminants, swine - grain
    b. Protein and mineral level very important
    c. Prevent fattening
    d. Make ration changes gradually
    e. Use high quality feed
3. Rapid gains are the most economical

INFORMATION SHEET

C. Finishing - beef, swine, and sheep

  1. High energy ration

    a. Grains are most often fed

    b. Convert to new ration gradually

    c. The ration is 60-80% of the finishing cost

    d. Protein is reduced from growing ration

  2. Maintain rapid gains

    a. Growth stimulants are used in beef and sheep

    b. Antibiotics prevent disease

    c. Be very aware of withdrawl periods listed on feed tags

  3. Prevent over-finishing

    a. Fat is expensive gain

    b. Goal is to increase meat grade by marbling

  4. Pasture finishing - sheep and beef cattle

    a. Accepted practice in sheep industry

    b. Lower labor and feed costs

    c. Becoming more common place as grain prices increase

    d. May result in a lower meat grade and slower gains

VI. Nutrition Management in Beef Animals

A. General nutrition

  1. All nutrients must be included in a balanced ration

  2. Non-protein nitrogen can be substituted for up to 33% of protein needs in cattle with a functional rumen and sufficient energy

  3. Supplements - Vitamin A and protein before and after calving

  4. Water requirements

    a. Variable upon weather and feed

INFORMATION SHEET

b. 990 pound animal at 70°F on dry feed will consume approximately 11 gal. H_2O per day

c. Optimum water temperature should not exceed 40°F

B. Feeding the breeding herd

1. Prevent fattening

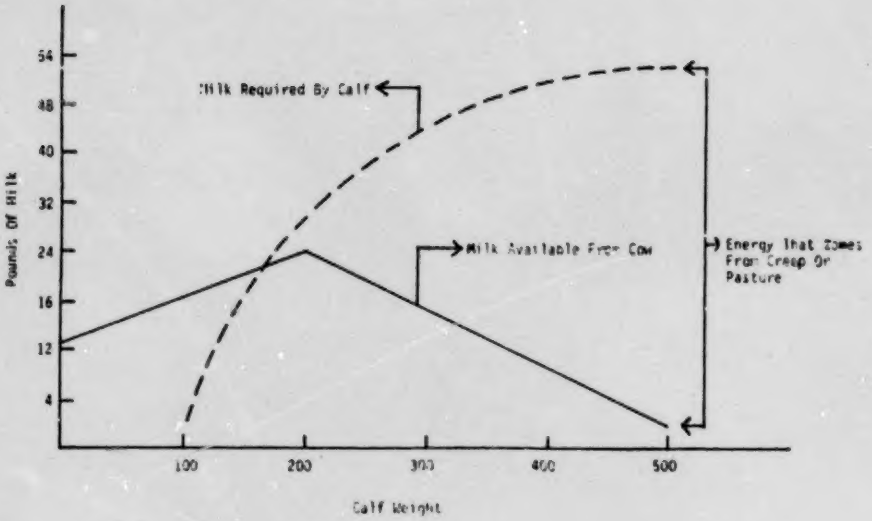
2. Most critical period is 30 days before calving and until 70 days after calving

3. Do not use growth stimulants on replacement bulls or heifers

C. Feeding calves

1. Nutrition received from the cow (TM 1)

CALF NUTRITIONAL REQUIREMENTS



2. Creep feeding

a. If milk production is down

b. If pasture is insufficient to meet the calves' needs

c. If it is economicly cheaper to feed grain

3. Orphan calves (see section on dairy calf rearing)

INFORMATION SHEET

D. Stocker or feeder phase

    1. Goal

        a. Produce a healthy lean calf for the feedlot

        b. Economical gains

    2. Common feed additives or growth stimulants used

        a. Nearly all feed additives for ruminants may be used

        b. An antibiotic is recommended to prevent problems from stress

    3. Common feeds

        a. Good roughages - alfalfa hay, quality silage

        b. Grains

        c. Good pasture

E. Finishing phase

    1. Convert to high concentrate rations slowly (allow 10 days)

    2. Maximum 90% concentrate in final ration

    3. (See Health section for nutrition related disorders)

VII. Nutritional Management of the Dairy Cow

A. Feeding the dry cow

    1. Maintenance ration

    2. Prevent fattening

    3. Limit legume hay as a prevention for milk fever

    4. Begin conversion to a higher energy ration two weeks before calving

B. Feeding the lactating cow

    1. Feed according to production - what is in the milk must be in the ration

    2. Energy

INFORMATION SHEET

      - a. Low energy is a common problem
      - b. Cows producing above 20 lbs. milk/day need grain
      - c. The energy requirement is closely tied to the milk fat produced
   - 3. Protein
      - a. Milk is 25% protein (dry basis)
      - b. NPN can supply up to 1/3 of protein equivalent
      - c. The ration should be 14-15% protein
   - 4. Calcium (Ca)
      - a. Milk is 1% calcium (NRC)
      - b. Legumes and limestone are good sources
   - 5. Phosphorus (P)
      - a. Must be fed at a 1:2 ratio with calcium
- C. Fiber requirement
   - 1. Low fiber
      - a. Lower butter fat test
      - b. Increase susceptability to lactic acidosis
      - c. Result in impacted rumen or Rumen Parakeratosis
   - 2. Fiber can be measured by
      - a. Chemical analysis
      - b. Chew factor - number of chews per pound of feed
   - 3. Over processing can lower the fiber quality in a feed
- D. Water needs
   - 1. Plenty of fresh water is very important
   - 2. Should be available free choice
- E. Feeding programs
   - 1. Phase feeding

INFORMATION SHEET

- a. Phase 1 - first 10 weeks of lactation maximum needs
- b. Phase 2 - second 10 weeks maximum intake
- c. Phase 3 - second half of lactation declining needs
- d. Phase 4 - dry period

2. Challenge feeding (lead feeding)
   - a. Challenge cow to reach maximum production
   - b. Feed according to production level
   - c. Adjust concentrates monthly by economics
3. Group feeding
   - a. Works well with "complete-feed" rations
   - b. Divide cows into 2, 4, or 6 groups according to production and/or stage of lactation
   - c. Cows are moved among group accordingly
4. Methods of supplementing high producing cows
   - a. Magnet feeder
   - b. Transponder feeder (computer controled)
   - c. Feeding in the parlor
   - d. Intense group feeding
5. Feeding on pasture
   - a. Requires high quality pasture near milking facilities
   - b. Will require some concentrate for maximum production

VIII. Feeding Calves - Birth to Weaning (TM 1)

- A. Importance of a good calf nutrition program
  1. 20% fatality rate in dairy calves
  2. Young calves when weaned or orphaned are dependent on humans for nurishment
  3. Young calves are very susceptable to disease

INFORMATION SHEET

B. Nutritional considerations of the newborn calf

1. Essentially monogastric
2. Require highly digestible ration - abomasal digestion only
3. Newborn calves require colostrum within 12 hours of birth for disease resistance and as a laxative

C. One to four days of age

1. Calves removed from cow 24-48 hours after birth to prevent over feeding
2. Fed colostrum by bucket for three days
3. See Table 1 for complete feeding schedule

TABLE 1 *Suggested Calf Feeding Schedule*

Feeding category	*Birth weight*	*First week*	*Second week*	*Third week*	*Fourth week*	*Fifth week*	*Total milk*
	lb	——Pounds of milk per day*——					lb
1	50-63	5	5½	6	5	4	178
2	64-73	5½	6	7	6	4	199
3	74-83	6	7	8	7	4	224
4	84-93	7	8	9	8	5	259
5	94-103	8	9	10	8	5	280
6	104-113	9	10	11	9	5	308
7	above 113	10	11	12	10	5	336

*Whole milk or milk replacer.

Source: Fryman, L. R., Harshbarger, K. E., and Muekling, A. J.: Feeding, managing and housing dairy calves. Ext. Cir. 992. College of Agriculture, Univ. of Illinois, December 1968.

D. Feeding day four to weaning

1. Milk replacers (dry milk protein is recommended)
2. Sour colostrum
3. Fresh milk
4. Daily feeding schedules
    a. Once-a-day - requires highest quality feed, minimum labor
    b. Twice-a-day - detect problems sooner

INFORMATION SHEET

5. Begin dry feeding at one week of age

E. Weaning and dry calf starters

1. Wean when calf is consuming 1 lb./day or more (3-6 weeks of age)

2. Starter characteristics

a. Palatible and high energy

b. 16-18% protein

IX. Nutritional Management Needs of Swine

A. Nutritional needs of the newborn - pig

1. Energy and protein - supplied by sow's milk

2. Iron - to prevent anemia

a. Available as an injection or oral supplement

b. Is available in common soil

B. Malnutrition in the newborn

1. Causes

a. Lack of milk production in the sow

b. Insufficient milk for large litters

c. Weak pigs unable to compete with littermates for milk

d. Excess milk in small litters (may result in scours)

2. Proper management to deal with malnutrition

a. Check sows for milk production

b. Balance litters by moving pigs among litters within two days of age

c. Place weak pigs in younger litters

d. Provide creep starter at one week of age

C. Feeding orphan pigs and milk replacers

1. Colostrum is essential for the newborn - it can be obtained for another sow that has just farrowed

INFORMATION SHEET

2. Commercial milk replacers are available
3. A homemade milk replacer
    a. 1 quart milk
    b. 1 pint half-and-half
    c. 1 raw egg
4. Feeding milk replacer
    a. warm to 98°- 100°F
    b. Feed every 3 hours in a shallow pan
    c. Keep utensils clean
5. Replacer should be 20-23% protein

D. Amino acid balancing in swine rations
1. A 12% protein ration with balanced amino acids may prove better than an unbalanced 16% ration
2. Lysine is the first limiting AA (Amino Acid)
    a. Corn requires lysine supplementation
    b. A slightly higher level of protein supplement is fed to meet the lysine requirement in addition to other AA
    c. Synthetic lysine is available
3. Tryptophan - second limiting AA
    a. Synthetic tryptophan not available

E. Garbage feeding
1. Can be utilized for sows or growing pigs
2. Best results come from feeding a combination ration of grain and garbage
3. By law, all garbage fed to swine must be cooked prior to feeding

INFORMATION SHEET

X. Nutritional Practices for Sheep

  A. Common nutritional deficiencies

    1. Energy - hunger

      a. From overgrazed pastures

      b. During lactation

      c. From poor quality feeds

    2. The amino acid methionine - needed for proper wool growth

  B. Water requirements

    1. Mature animal - 1 gal. per day

    2. Feeder lambs - ½ gal. per day

    3. Sufficient water is often supplied in green grass or high moisture forage

  C. Feeding orphan lambs

    1. Grafting should be attempted - often requires the skinning of the adopted ewes own dead lamb

    2. Colostrum should be administered immediately following birth

    3. Milk replacers

      a. 20-24% protein

      b. 30% fat

      c. Milk is fed cold (30°- 40°F) to prevent overeating and is fed free choice

    4. Palatable solid feed is provided

    5. Lambs are weaned when they consume ½ lb. dry feed per head daily (21-35 days of age)

  D. Special management practices

    1. Iodized salt, when used as an intake regulator in free choice fed concentrate, may result in iodine toxicity

    2. Break up chunks and lumps of salt and mineral when fed in the granular form

INFORMATION SHEET

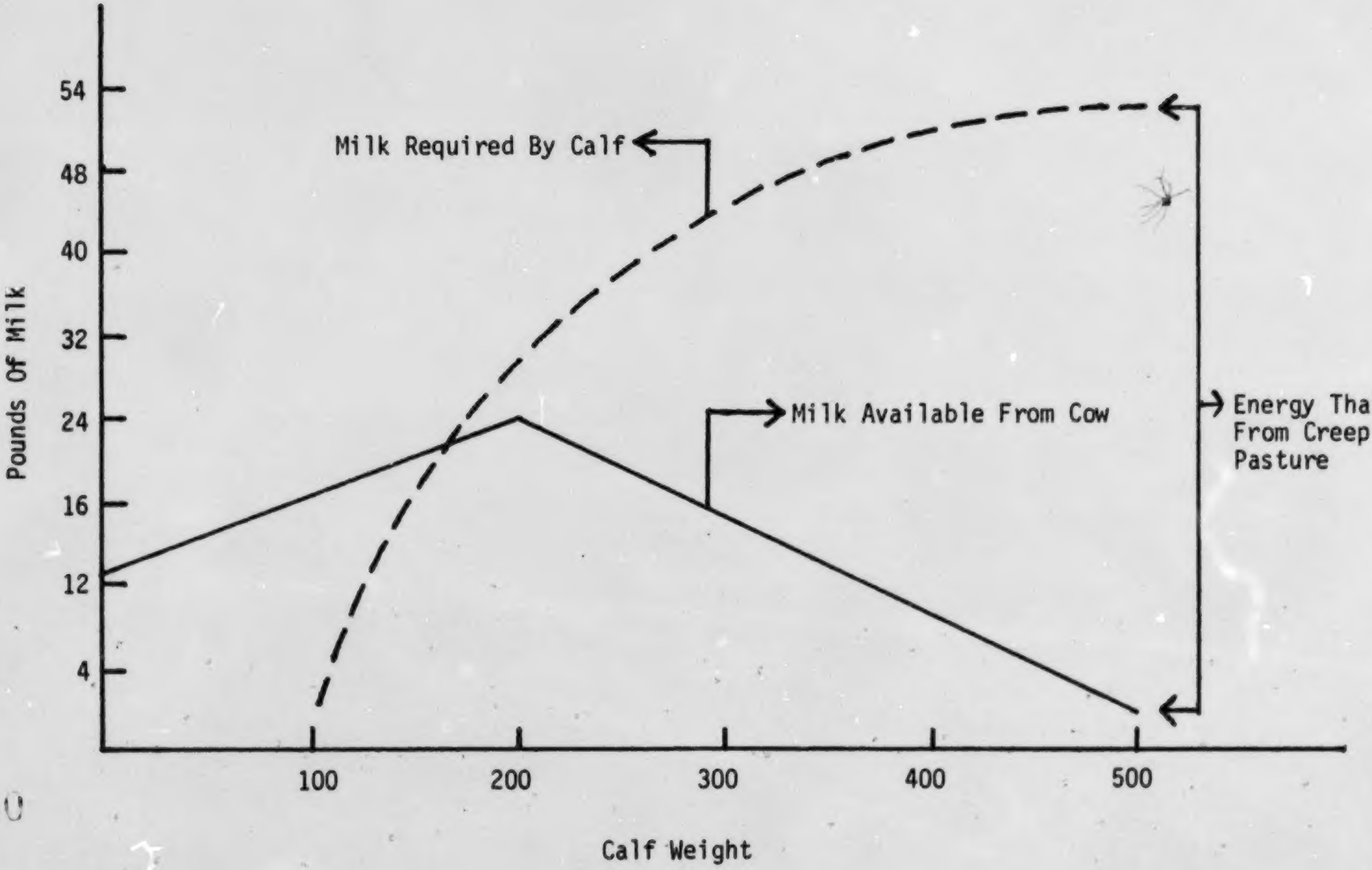
XI. Recommended Feeding Practices for Horses

- A. Nutritive needs
  - 1. Horses are fed for growth and work
  - 2. Horses should never be fattened or starved
  - 3. A horse must be fed and watered twice daily, three times daily when working
- B. Feedstuffs
  - 1. Grain - best utilized if flaked or unprocessed
  - 2. Hay - fed either long or pelleted
  - 3. Never feed dusty or moldy feeds
- C. Special feeds
  - 1. Treats - apples, carrots, sugar
    - a. Never feed sugar in large amounts
    - b. Use only as supplements to a balanced ration
  - 2. Feeds that impart bloom or gloss
    - a. Corn oil - 2 oz. per day
    - b. Whole flaxseed soaked - One handful soaked over night, fed in morning, feed twice weekly
- D. Feeding the foal
  - 1. The newborn should be up and receive colostrum within 30 min. to 2 hours after birth
  - 2. A commercial creep feed, which includes additional copper and iron, is recommended to prevent anemia
- E. General feeding management practices
  - 1. Learn the individual needs of each horse
  - 2. Keep feed and water containers clean
  - 3. Regulate water to the horse when hot
  - 4. Feed grain only to horses after they have cooled

INFORMATION SHEET

5. Feed hay before grain
6. Do not work a horse immediately after feeding grain
7. A roughage is needed when feeding more than seven pounds of grain

CALF NUTRITIONAL REQUIREMENTS



TM 1

SC U5-19

NUTRITION

UNIT V

TEST

1. Match the following terms with their appropriate definitions on the right.

_____a. Rate of gain

_____b. Colic

_____c. Creep feeding

_____d. Flushing

_____e. Laxative

_____f. Net Energy for milk (NE milk)

_____g. Anemia

1. The practice of increasing energy prior to breeding

2. The energy needed solely for milk synthesis

3. Abdominal discomfort

4. The growth of an animal during a specific length of time (usually pounds per day)

5. Supplementing feed to the young nursing animal

6. Fed to brood animals to ease digestive upset during parturition

7. Low red blood cell count, commonly from iron deficiency

2. List four reasons for properly feeding the breeding herd.

a.

b.

c.

d.

3. List two feeding management practices for the breeding herd during each of the following reproduction phases.

a. Dry or barren period

1.

2.

TEST

b. Prior to and during breeding

1.

2.

c. Gestation

1.

2.

d. Before and after birth

1.

2.

e. Lactation

1.

2.

4. Describe three nutritional requirements of breeding males.

a.

b.

c.

5. Complete the chart below by inserting the letter of the correct rations listed below which corresponds as an acceptable ration for the animals given and their phase of growth. (Each blank may have more than one ration)

	Starter	Grower	Finisher
Swine	______	______	______
Beef	______	______	______
Sheep	______	______	______

TEST

Ration A	Ration B
Grain ration with no roughage	Low energy, roughage with protein and mineral supplement
Ration C	**Ration D**
Pelleted ration, 20% protein, high digestibility	Grass pasture

6. Place a check by the best beef nutritional management practices.

_____a. Vitamins are never supplemented

_____b. Provide water of a moderate temperature

_____c. Use growth stimulants on all animals

_____d. Creep feed calves if pasture is short

_____e. Change rations slowly

_____f. Fatten breeding stock

_____g. Antibiotics should be fed to stressed animals

_____h. Non-protein nitrogen should be fed with a high energy feed

7. List five nutritional management practices for feeding calves from birth to living.

a.

b.

c.

d.

e.

8. List five nutritional management practices for feeding calves from birth to weaning.

a.

b.

TEST

c.

d.

9. List two causes of malnutrition in the newborn pig and give a remedy for each.

   a.

   b.

10. Show an understanding of nutrition management practices for sheep by judging the following statements as true or false. (Circle the correct answer).

    a. T F Energy should be supplemented on poor pasture.

    b. T F Grafting of nursing lambs should not be attempted.

    c. T F Lumps in granular salt should be broken up before feeding.

    d. T F Feeding orphan lambs is not profitable or recommended

    e. T F Lambs are weaned when they are consuming at least ½ lb. of dry feed per day.

11. Show knowledge of recommended feeding practices for horses by answering the following questions.

    a. How often should working horses be fed and watered?

    b. List two management practices to be considered when feeding and watering hot horses.

    c. Are horses ruminants or monogastric?

NUTRITION

UNIT V

ANSWERS TO TEST

1. a. 4 e. 3
   b. 6 f. 5
   c. 2 g. 7
   d. 1

2. Any four of the following:
   1. Essential for fertility
   2. Produce more and stronger young (larger litters in swine)
   3. Wean more pounds of calves, lambs, or pigs
   4. A properly fed herd is a healthier herd
   5. A proper ration should:
      a. Provide energy for maintenance
      b. Provide energy for growing replacement animals
      c. Allow proper fetal development
      d. Encourage maximum milk production

3. a. Any two of the following:
   1. Prevent fattening
   2. Increase energy as breeding time nears
   3. Feed to improve body condition

   b. 1. Maintain a slightly increasing plane of nutrition through breeding
   2. Practice flushing in sheep and swine

   c. Any two of the following:
   1. Prevent fattening
   2. Allow for first pregnancy animals to grow
   3. Feed highest quality feed as parturition nears

   d. 1. Feed a laxative ration
   2.

ANSWERS TO TEST

e. Any two of the following:
   1. Feed a high energy ration
   2. Provide a good calcium source
   3. Convert to the high energy ration gradually

4. Any three of the following:
   1. Feed tc maintain condition
   2. After breeding feed to rebuild lost conditioning
   3. Prevent fattening
   4. Usually a larger allotment of the female ration
      a. Boars - 5-7 lbs. corn equivalent per day
      b. Bulls - legume hay free choice, small amounts of grain
      c. Rams - pasture adequate, supplement during breeding season
      d. Stallion - feed a balanced ration giving attention to protein, minerals, and vitamins.

5.

	Starter	Grower	Finisher
Swine	C	A	A
Beef	A,C	B,D	A
Sheep	A,C	B,D	A,D

6. Those that should be checked are:

   b. d. e. g. h.

7. Any five of the following:
   1. Feed the dry cow a maintenance ration
   2. Feed lactating cow according to production
   3. The lactating cow should receive 14-15% protein.
   4. Legume and limestone are a good source of calcium.
   5. Phosphorus is fed at a 1-2 ratio.
   6. Plenty of fresh water is provided.
   7. Others to the satisfaction of the teacher.

ANSWERS TO TEST

8. Any five of the following:
   1. Feed highly digestible ration.
   2. Feed colostrum within 12 hours of birth for three days.
   3. Remove from cow 24-48 hrs after birth.
   4. Feed milk replacers after four days.
   5. Feed fresh milk at regular intervals.
   6. Dry feed at one week of age.
   7. Wean when calf is consuming one pound per day.
   8. Others to the satisfaction of the teacher.

9. Any two of the following:
   a. Under feeding.
   b. Over feeding.
   c. Iron deficiency
   Remedies to the satisfaction of the instructor.

10. a. T d. F
    b. F e. T
    c. T

11. a. Two-three times daily
    b. Limit water to hot horses and do not feed
    c. Monogastric

ANIMAL HEALTH

UNIT I

CHARACTERISTICS OF GOOD HEALTH AND PREVENTIVE VETERINARY MEDICINE

TERMINAL OBJECTIVE

Upon completion of this unit, the student will be able to list types of disinfectants and antiseptics, recognize good animal health, and list signs of poor animal health. He (she) should also be able to list methods, hazards, and applications of vaccines. This will be evidenced by scoring eighty-five percent on the post test.

SPECIFIC OBJECTIVES

After completion of this unit, the student will be able to:

1. Match terms associated with good animal health and preventive veterinary medicine
2. List five signs of good animal health
3. List five signs of poor animal health
4. List seven types of disinfectants and antiseptics
5. Name six characteristics of ideal disinfectants
6. Name five causes of infectious diseases
7. Name five means of transmission of infectious agents
8. Name five ways infections may enter the animal
9. State the normal temperature, pulse, and respiration rates of common farm animals
10. Discuss in writing methods of disease prevention through management and sanitation
11. Discuss in writing the hazards of vaccinations
12. Discuss in writing the applications of vaccines, in regard to purchase, use, and keeping of records
13. Identify the different types of injections

ANIMAL HEALTH

UNIT I

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheet
2. Provide students with Information Sheets
3. Make transparencies
4. Discuss Terminal and Specific Objectives with students
5. Discuss Information Sheets
6. Give Test

Students:

1. Read Objective Sheet
2. Study Information Sheets
3. Take Test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objective Sheet
2. Information Sheets
3. Transparency Masters

   TM 1 - TYPES OF DISINFECTANTS AND ANTISEPTICS

   TM 2 - ANIMAL TEMPERATURE, PULSE AND RESPIRATION RATES

   TM 3 - ADEQUATE SPACE REQUIREMENTS

   TM 4 - TYPES OF INJECTIONS
4. Test
5. Answers to Test

INSTRUCTIONAL MATERIALS

References:

1. Beef Cattle Production. Kenneth A. Wagnon, Reuben Albaugh, George H. Hart, The MacMillam Company, New York, New York.

2. Swine Production, Clarence E. Bundy, Ronald V. Diggins, Prentice-Hall, Inc., Englewood Cliffs, New Jersey.

3. The Stockman's Handbook, M.E. Ensminger, The Interstate Printers and Publishers, Inc., Danville, Illinois.

4. OSU Extension Facts "Beef Cattle Parasite Control" , Sidney E. Kung, Oklahoma State University, Stillwater, Oklahoma.

5. Lecture outline of Preventive Veterinarian Medicine, I.A. Schipper, 5th Edition, Burgess Publishing Company, Minneapolis, Minnesota.

ANIMAL HEALTH

UNIT I

INFORMATION SHEET

I. Terms and Definitions

   A. Microscopic anatomy - histology

   B. Macroscopic anatomy - gross anatomy

   C. Comparative anatomy - Comparing systems of one species to those of another

   D. Osteology - study of bones

   E. Arthrology - study of joints

   F. Myology - study of muscles and accessory organs such as tendons and ligaments

   G. Splanchnology - Viscera, movable parts inside the body such as digestive, respiratory, and urogenital systems

   H. Angiology - study of circulation

   I. Neurology - study of nervous system

   J. Aesthesiology - study of sense organs

   K. Antiseptics - substances that kill or prevent growth of microorganisms on living tissue

   L. Disinfectant - prevents infection by destruction of pathogenic microorganisms, usually applied to inanimate objects

   M. Sanitizer - reduces the number of bacterial contaminants to levels judged safe by public health requirements

   N. Sterilization - Complete destruction of all forms of life

   O. Germicide - destroys microorganisms. (Note: Bactericide, Fungicide, Viricide, Amebicide

   P. Resident bacteria - skin bacteria that survives and multiplies on skin

   Q. Transient bacteria - skin bacteria that varies quantitively and qualitatively with the individual; any organism coming in contact with the skin

   R. Disease - Functional disturbance usually manifested by physical signs (symptoms), a departure from normal

INFORMATION SHEET

S. Infectious disease - A disease of men or animals resulting from an infection

T. Infection - The entry and development of a pathogen in or on the body of an animal

U. Non-infectious disease - A disease of men or animals not due to an infection but resulting from physical or chemical agents or metabolic derangement

V. Incidence of disease - The number of cases of a disease occurring during a prescribed time interval

W. Prevalence of disease - The total number of cases of a disease at a particular time

X. Symptom - Any observable sign or evidence of disease

Y. Pathogen - Any disease-producing organism

Z. Incubation period - The period between the exposure to the disease agent and the appearance of the first symptoms or signs of the disease

AA. Carrier of disease - An animal which harbors in his body the specific organism of a disease without obvious symptoms

BB. Vehicle of disease - Any medium by which a disease agent may be spread

CC. Abortion - The expulsion of a dead or immature fetus

DD. Chemotherapy - the treatment of disease by chemical agents

EE. Metabolism - The sum of all the physical and chemical processes by which the tissues are formed and maintained and energy is produced for use by the body

II. Signs of Good Animal Health

A. Contentment

B. Alertness

C. Cudding by ruminants

D. Sleek hair coat

E. Bright eyes and pink eye membrane

INFORMATION SHEET

F. Normal pulse rate, temperature, and breathing rate

III. Signs of Poor Animal Health

A. Abnormal body temperature

B. Inflamation - cardinal signs

1. Pain

2. Heat

3. Redness

4. Swelling

C. Anorexia

D. Depression

E. Lacrimation

F. Diarrhea

IV. Types of Disinfectants and Antiseptics (See TM 1)

A. Acids - lactic and acetic, used usually as preservatives

B. Alkalies - most effective against viruses, sodium hydroxide (lye), used at 2.5% solutions

C. Detergents - soaps (active against gram positive organisms, removes large numbers, kills some). Ammonium compounds (active against gram-positive and gram-negative bacteria; used as sanitizers).

D. Phenols, Creosols, resorcinols, hexachlorophene. Note: (used in foot baths)

E. Heavy metals - mercuriole, copper sulphate, (foot rot prevention) zinc oxide, silver nitrate

F. Halogens - chlorine, iodine, odophors

G. Chlorohexidine - non toxic, used on wounds and premises

H. Alcohols - methyl or ethul used primarily

I. Aldehydes - effective against bacteria, fungi, bacterial spores, viruses (foot rot control)

J. Dyes - Chemotherapeutic, contribute to wound healing

K. Physical disinfection - temperature, light radiation, drying.

INFORMATION SHEET

V. Characteristics of Ideal Disinfectants
  - A. Good germicidal power - wide spectrum
  - B. Non toxic to higher life
  - C. Stability
  - D. Non-corrosive
  - E. Penetration
  - F. Homogenity
  - G. Solubility
  - H. Economical
  - I. Power to remove dirt and fatty substances
  - J. Deodorizing power

VI. Causes of Infectious Diseases
  - A. Genus
    - 1. Swine - hog cholera
    - 2. Dog - canine distemper
  - B. Breed
    - 1. Pink eye pigment
    - 2. Dairy versus beef
    - 3. Photodynamic diseases - skin color
  - C. Genetic
    - 1. Hernia
    - 2. Lethol genes
    - 3. Dwarfism
    - 4. Cryptorchidism
  - D. Age - young more susceptible than mature
  - E. Sex

INFORMATION SHEET

F. Nutritional

G. Endocrine - goiter, infertility

H. Trauma

1. Electrical - lightning
2. Temperature
3. Sight - photosensitization

VII. Means of Transmission of Infectious Agents

A. Sexual contact

1. Vibrosis
2. Trichomoniosis
3. Septospirosis

B. External parasite

1. Anaplasmosis - mosquitoes
2. Swine pox-lice
3. Pinkeye - flies

C. Formites (any substance other than food)

1. Hog crates - erysipelas
2. Transportation vehicles - brucellosis, foot rot.
3. Sale barn

D. Excretions, secretions

1. Brucellosis - vaginal
2. Septospirosis - urine

E. Food

1. Water - leptospirosis, brucellosis, anthrax
2. Pasture ; forage - erysipelas, anthrax
3. Moldy feeds - mycotoxicosis, sweet clover poisoning

INFORMATION SHEET

F. Airborne

  1. Dust - pinkeye, shipping fever
  2. Spores - anthrax
  3. Droplet - TB

VIII. Entry Points of Infection

A. Exogenous

  1. Skin breaks
    a. Bites - rabies
    b. Needle teeth - erysipelas
    c. Traumatic wounds - anthrax, blackleg
    d. Insects - anaplasmosis
  2. Mucous membranes
    a. Avitaminosis A - pinkeye
    b. Injury (parasites) - hemorrhage, lumpy jaw
  3. Respiratory tract
    a. Dust - shipping fever, TB
    b. Moisture Droplets - IBR
    c. Exhaust fumes - shipping fever
  4. Genitourinary tract - coition, AI
    a. Brucellosis
    b. Vibrosis
    c. Septospirosis
    d. Vaginitis - IBR
  5. Eyes
    a. Dust - pinkeye
    b. Trauma - tail switching

INFORMATION SHEET

6. Intestinal tract

    a. Licking - brucellosis, parasites

    b. Trauma - traumatic gastritis

    c. Toxins - enterotoxemia

B. Endogenous

1. Mastitis

2. Enterotoxemia

3. Tetanus

4. Pasteurellosis

IX. Animal temperature, pulse, and respiration (See TM 2)

Animal	Normal Rectal Temperature		Normal Pulse Rate	Normal Breathing Rate
	Average	Range		
	(°F)	(°F)	(min)	(min)
Cattle	101.5	100.4-102.8	60-70	10-30
Sheep	102.3	100.9-103.8	70-80	12-20
Goats	103.8	101.7-105.3	70-80	12-20
Swine	102.6	102 -103.6	60-80	8-13
Horses	100.5	99 -100.8	32-44	8-16
Poultry	106.0	105 -107	200-400	15-36

X. Disease Prevention Through Management and Sanitation

A. Newborn

1. Preparation of prospective mother

2. Post-parturient case of young

B. Additions to herd or flock

1. Source

2. Transportation

3. Isolation

INFORMATION SHEET

- C. Housing
    - 1. Provide adequate space (See TM 3)
    - 2. Location
    - 3. Ventilation
    - 4. Sanitation and disinfection
- D. Nutrition
    - 1. Provide balanced rations - prevents stress, promotes adequate lactation, disease prevention.
- E. Disposal of dead animals and birds
    - 1. Burn completely
    - 2. Bury - four feet of earth covering animal
    - 3. Rendering plant
    - 4. Never feed dead birds or animals to swine
    - 5. Remove dead animals from water run-off areas

XI. Hazard of Vaccination

- A. Attenuated
    - 1. Reversion of virulence
    - 2. Disease transmission
    - 3. Severe reactions - disease outbreaks
    - 4. Abortions
    - 5. Fetal defects
    - 6. Potential transmission to humans
    - 7. Stress and latent infection
    - 8. Deterioration
        - a. Storage
        - b. Preparation - administration
    - 9. Contamination

INFORMATION SHEET

B. Inactivated
   1. Few reactions
   2. Irritations
      a. Vehicle
      b. Tissue medium - postvaccinal encephalitis

C. Antiserum
   1. Infection - spread of disease, hepatitis
   2. Anaphylactic shock

XII. Application of Vaccines

A. Purchase of vaccines
   1. Purchase vaccines only from sources maintaining refrigerated storage
   2. Purchase vaccines with sufficient expiration dates for your future use; purchase only quantity needed for immediate needs
   3. Transport attenuated vaccines out of sun and keep them refrigerated
   4. Store all vaccines in refrigerator until ready to use
   5. Purchase and use only vaccines that are useful under your husbandry program

B. Using vaccines
   1. Use sterile equipment
      a. Boil syringes and needles for 30 minutes
      b. Never use chemical disinfectants on equipment when administering attenuated vaccines - destroy living agent
      c. Chemical disinfection satisfactory for inactivated vaccines, antiserums, and toxoids
   2. Keep attenuated vaccines on ice and out of sun until administered

INFORMATION SHEET

3. Use sterile techniques during administration
    a. Disinfect vial stoppers with alcohol before needle penetration
    b. Use separate needle for filling syringe and for administration
4. Never freeze vaccines
5. Read labels before use - follow instructions
6. Shake thoroughly before use
7. Discard partially used containers - avoid contamination
8. Destroy empty attenuated vaccine containers

C. Records
1. Keep one or two unused vials of vaccine - under refrigeration
    a. Provides source of test material if unsatisfactory results occur
    b. Provides source for records of expiration date, serial number, and manufacturer
2. Record
    a. Date used
    b. Number and identification of vaccinated animals
    c. Source of supply
    d. Expiration date of vaccine
    e. Serial number of vaccine
    f. Manufacturer of vaccine
    g. Dosage administered
    h. Reactions following administration, if observed

XIII. Types of Injections (See TM 4)

A. Intraperitoneal

B. Oral

INFORMATION SHEET

C. Intramuscular

D. Intravenous

E. Subcutaneous

F. Udder

TYPES OF DISINFECTANTS AND ANTISEPTICS

~~TABLE~~. DISINFECTANTS – SUGGESTED APPLICATION

	Disinfectant	Strength	Application	Remarks
ALKALIES	**Lye**	2 percent (one 13½ ounce can to five gallons water)	Farrowing pens to control infectious organisms and parasites. Pens and stalls following outbreaks of hog cholera, vesicular exanthema and erysipelas.	Very caustic—rubber garments and goggles should be worn to protect the face, eyes and hands. Be sure pen floors and walls are thoroughly dry before allowing animals to enter, or leave lye solution in contact with pens and walls for at least 8 hours and then rinse thoroughly. Not effective against the organisms of Johne's disease or tuberculosis. Effective virucide.
		5 percent (one 13½ ounce can to two gallons water)	Pens and stalls following outbreaks of anthrax, malignant edema and blackleg. Also used as a cold soak for milking machine inflations.	
	Lime (white-wash)	Slaked quicklime (38 pounds) with 15 pounds salt. Enough water for spraying or brushing	Annual disinfections of barns, poultry houses and pens—controls spread of warts, ringworm and miscellaneous diseases that may be harbored in cracks of walls, floors and wood fences.	Addition of 4 percent saponated creosol or 1 pound lye to approximately 5 pounds lime is often helpful. Commercial whitewash preparations containing insecticides are also available. Should be used when fresh.
	Lime (unslaked)	Liberal applications uniformly applied over entire area	Spread liberally on soil of poultry and livestock yards. Cover dead animals or poultry before burying to prevent spread of disease by rodents. Useful in the control of footrot. May be spread with 5 percent copper sulfate where cattle or sheep will walk through daily, or by water and feed trough.	May cultivate into soil. Exposure to air will destroy disinfection value.
	Sal soda	10.5 percent (13½ ounces to 1 gallon water)	Effective for organisms of foot-and-mouth disease and vesicular exanthema.	May be used in place of lye.
	Soda ash	5 percent (1 pound to 3 gallons water)	Same as sal soda.	Most effective in hot solution. May be used in place of lye.
HALOGENS	**Iodine** (tincture)	2 to 7 percent	Navel or skin disinfectant. Treatment of ringworm or warts.	Very good skin disinfectant. If used too frequently or in too strong a solution, it will become irritating. Corrosive to metal. Never use on sharp instruments.
	Idophore (tamed iodine)	75 to 150 parts per million of available iodine	Dairy utensiles.	Use as iodine plus detergent. Release of iodine is controlled. Germacidal action is destroyed by organic material.
	Chlorines (sodium hypochlorate) (Chlormine-T)	200 parts per million	Dairy utensiles. Udder wash. Wounds.	Action decreased by organic materials. Disagreeable odor. Irritating to skin under prolonged use or too high concentrations.
	Chlorinated lime	20 percent solution	Destory disease organisms in dead animals, droppings and mixed in organic material. Sanitize washing, drinking and feed containers.	Action destroyed by organic materials. Good disinfectant and deodorant. Loses chlorine when exposed to air. Very irritating to nose and throat.
DETERGENTS	**Anionic detergents**			
	(Soaps)	Liberal amounts	Skin disinfectant. Disinfectant for food and water untensiles and hands.	Removes dirt and infectious agents. Low toxicity. Low antiseptic action.
	Cationic detergents **Benzalkonium** **Chloride zephiran (Barrol)** **Cetyl pyridinum (Ceepryn)**	1:1,000 to 1:2,000	Udder wash, skin disinfectant and instrument disinfectant. Ringworm treatment. Dairy utensil sanitation. Food and water utensiles. Hands.	Active in the presence of organic matter. Non-irritating. Detergent action plus antiseptic action. Low toxicity. Action neutralized by common soaps.
MERCURIALS	**Mercury bichloride** (Corrosive sublimate) (Mercuric chloride)	1:1,000 solution	Instruments. Water and feed utensiles. Soil—1 gallon per 10 square feet.	Unreliable as a germ killer. Toxic when taken internally. Never use on metals. Value decreased by organic materials.
	Merbromium (mercurochrome)	2 percent	Skin wounds.	Has good penetration.
	Nitromersol (Metaphen)	.5 percent	Mucous membranes.	
COAL and WOOD TAR DERIVATIVES	**Phenol**	5 percent	Cauterize infected tissue.	Very toxic and costly as a disinfectant. Not practical to use as a disinfectant.
	Creosol (Cresylic acid) **Saponated creosol solutions** (Lysol)	2 to 4 percent (one cup to 2 gallons water makes 4 percent solution)	Foot bath, pens and housing unit or vehicles. For general annual disinfection or following outbreaks of brucellosis, hog cholera, shipping fever, erysipelas or tuberculosis. Disinfection of surgical instruments such as for castration, dehorning, tattooing and docking.	To determine quantity needed for building, multiply length of building times width and divide by 500. This sum equals the number of gallons needed for floors, walls, ceiling and equipment. More bactericidal and less toxic than phenol. Readily absorbed in milk, meat and eggs. Mixes best in soft water. Saponated creosols are readily soluble; soap dissolves grease. Both have good penetration. Possibly best universal farm disinfectants.
	Creosote	Undiluted	Some bacterial action.	Mixture of phenols from wood tar. Two to three times as effective as phenol. Poorly soluble in water.
	Pine tar	Undiluted	Antiseptic action. Used in bandaging. Repells insects on wounds.	Very poor solubility in water. Effects are due to phenols.
MISCELLANEOUS	**Formaldehyde**	½ to 1 percent solution	Foot disinfectant to treat foot rot or also as walk-through bath for foot rot prevention.	Must be used cautiously as it will harden tissues and may cause injury.
		Gas produced by adding 1½ pounds potassium permanganate to 3 pints formaldehyde. Sufficient for 100 cubic feet.	Fumigation of incubators and poultry houses.	Requires high humidity, temperatures of at least 65 degrees and a well sealed building to prevent gas escape.
		4 to 5 percent	Effective against bacteria and viruses. Applied to contaminated buildings or incubators.	Toxic upon oral intake. Requires at least 8 hours contact to be effective. Bad disinfectant.
	Alcohols	70 percent	Skin and instrument disinfectant.	Most effective at 70 percent.
	Boric acid	6 percent solution	Wash for eyes and other sensitive body tissues.	Weak antiseptic. Prevents organisms from growing.

TM 1

Animal Temperature, Pulse, and Respiration Rates

Animal	Normal Rectal Temperature average	Range	Normal Pulse Rate	Normal Breathing Rate
	°F	°F	(min.)	(min)
Cattle	101.5	100.4-102.8	60-70	10-30
sheep	102.3	100.9-103.8	70-80	12-20
Goats	103.8	101.7-105.3	70-80	12-20
Swine	102.6	102-103.6	60-80	8-13
Horses	100.5	99-100.8	32-44	8-16
Poultry	106.0	105-107	200-400	15-36

TM2

BASIC DESIGN DATA FOR PLANNING LIVESTOCK AND POULTRY HOUSING

ADEQUATE SPACE REQUIREMENTS

Beef Cattle

DATA SUMMARY

Space Requirements:

Lot Area Sq Ft/Head
- 400 lot unsurfaced
- 150 lot partially surfaced
- 55 lot surfaced, no shelter
- 30 lot surfaced, with open housing

Resting Area in Shed or under Shade
- 25 to 30 sq ft for mature cows
- 20 to 25 sq ft for feeders 600# to market
- 15 to 20 sq ft for calves to 600#

Corrals
- Holding pens, 20 sq ft per mature animal
- Crowding pen, 150 sq ft or one truckload
- Working chute, 18 to 30 sq ft
- Sorting alleys, 10 to 12 ft wide

Feeding Space

When all animals eat at once
- 18" to 22", calves to 600#
- 22" to 26", 600# to market
- 26" to 30", mature cows

Feed Always Available
- 4" to 6", hay or silage
- 3" to 4", grain or supplement
- 6", grain and silage

Watering
- 40 head per water space in drylot
- 15 gal/head/day, 5500 gal/year

Bunk Dimensions:

Throat Height

Up to 18" for calves, 22" for feeders and mature cows. Use 30" heights only if hogs will run with cattle.

Widths
- 48" if fed from both sides
- 54" to 60" if bunk is divided by mechanical feeder
- 18" bottom width if fed from one side

Dairy Cattle

Loose Housing:
- Bedded (loafing) area--60 sq ft per cow (minimum), 100 sq ft per cow recommended
- Holding area--20 sq ft per cow to 20 cows, 400 sq ft plus 10 sq ft per cow for herds over 20 cows

TM [illegible] 3

Individual calf pen area-20 to 25 sq ft per calf

Dimensions of Free Stalls:

Calves	
0-6 weeks	1 1/2' x 3 1/2'
6 weeks to 6 months	2' x 4'
Heifers	3' x 5'
Weight, herd average	
1000 lb	3'-6" x 6'-10"
1200 lb	3'-9" x 7'-0"
1400 lb	4'-0" x 7'-2"
1600 lb	4'-2" x 7'-4"

Sizes of Cow Stanchions (using electric cow trainers):

Weight of Cow	Stanchions		Comfort Stalls		Tie Stalls	
	Width	Length	Width	Length	Width	Length
1200 lb	4'-0"	5'-4"	4'-3"	5'-7"	4'-6"	5'-10"
1400 lb	4'-3"	5'-8"	4'-6"	5'-11"	4'-9"	6'-2"
1600 lb and over	4'-6"	6'-0"	4'-9"	6'-3"	5'-0"	6'-6"

Hogs

Barn Space Required:

Brood Sows: Farrowing pen 6' x 8' pen per sow and litter
Farrowing stall 16" to 18" side space on each side of sow
22" to 24" sow stall width, 7' long (6' min)
Minimum area--1 sow per 4' x 6' plus alley

Growing and finishing (solid or slotted floor)
Weaning to 100 lb--4 to 5 sq ft per hog
Over 100 lb--8 to 10 sq ft per hog
(Does not include feeder and alley space)

Gilts--12 sq ft per gilt

Boars and yearlings or older sows--15 to 18 sq ft per animal

Feeder Space:

Self-feeders: 1 lineal foot or one feeding hole per 4 to 5 pigs

Feed trough (feed and water): 12 to 15 inches of trough length per pig

Automatic waterers: one waterer or one opening per 20 to 30 pigs

Legume pasture: 15 to 20 growing fattening pigs per acre
10 mature sows with or without suckling pigs per acre

Straw for bedding: 500 to 1000 lb per adult head per year, or for feeder pigs, 100 lb per head 100 lb of gain

Ventilation: Insulated barn--150 cu ft of air per minute per 1000 lb of hogs (two or more fans or two-speed fan)
Insulate to provide R = 14 in walls, 18 in ceiling

Uninsulated barn--60 to 80 cu ft of air per minute per 1000 lb of hogs (two or more fans or two-speed fan)
(Ventilation will be poor in an uninsulated barn)

Sheep

Barn Space Requirements (does not include feeder or alley space):
- Fattening lambs--8 to 12 sq ft per animal--all door openings 4 ft or wider
- Ewes or rams--10 to 14 sq ft per animal
- Ewes with lambs--12 to 16 sq ft per ewe
- Lambing--16 sq ft per pen (one pen per six ewes)
- Yard space--approximately two to three times housing space

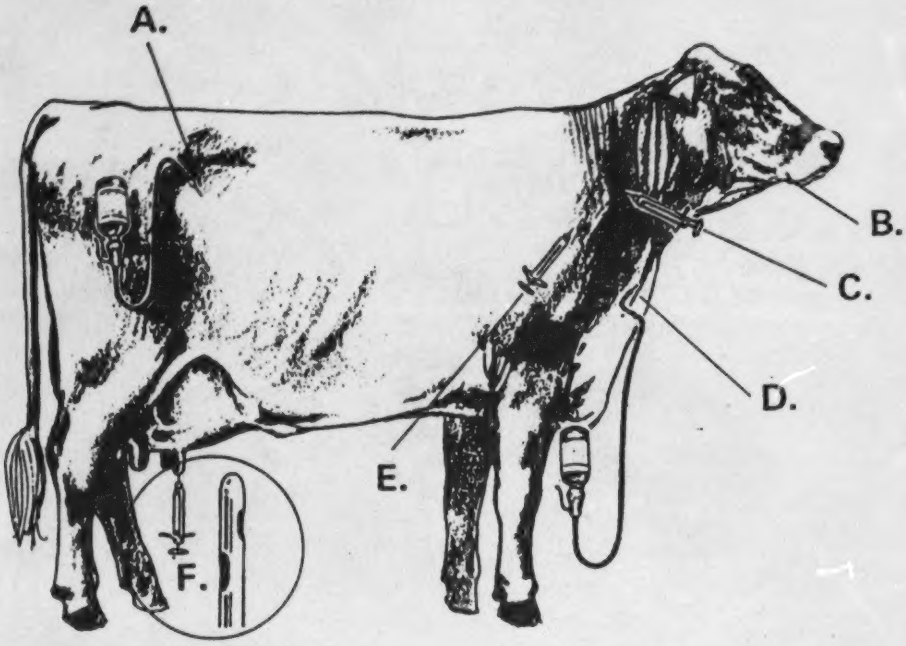
Feeding and Watering Equipment:
- Creep panel opening--7 to 10 in
- Feed trough--15 lineal in per ewe
  12 lineal in per feeder lamb
- Self-feeder (feeder lambs)--2 to 3 lineal in per head
- Hay bunk (ewes self-fed)--5 to 6 lineal in per ewe
- Waterer--100 to 200 head per double opening automatic waterer or per tank opening (water all feeder lambs within 100 ft of feeding area)

Poultry

Chicks and Pullets:
- Brooder space--1/2 sq ft per chick to 6 weeks
  1 sq ft to range age
- Hover space--7 to 10 sq in per chick (not over 350 chicks per hover)
  electric brooding--80 to 100 chicks per heat lamp
- Range shelter--3/4 to 1 sq ft per bird
- Feed hoppers--1/2 lineal in per chick to 4 weeks
  1 lineal in per chick to range age
  2 lineal in per bird on range
- Waterers--one 1-gal waterer per 75 to 100 chicks (first 2 weeks)
  1/2 lineal in automatic watering trough per pullet (over 2 weeks)
  Provide extra watering space during extreme hot weather

Laying Hens:
- Laying House--1 sq ft building floor space per bird for cage laying (approximate); use manufacturer's recommendations for actual cage space per bird
  1 1/4 sq ft per bird feed and water over pits
  2 1/2 sq ft per bird feed and water on floor
- Roosts--8 to 10 in per bird--space roosts on 12-in centers
- Feeders--2 lineal in per bird
- Individual nests--one individual nest per 4 to 5 birds
- Community nests--one 2' x 4' community nest per 50 birds

TM 3



Types of injections (Transparency #5)

a. Intraperitoneal
b. Oral
c. Intramuscular
d. Intravenous
e. Subcutaneous
f. Udder

ANIMAL HEALTH

UNIT I

TEST

1. Match the proper terms and definitions

______1. Comparative anatomy

______2. Osteology

______3. Arthrology

______4. Myology

______5. Angiology

______6. Neurology

______7. Anteseptic

______8. Disinfectant

______9. Disease

______10. Infection

______11. Symptom

______12. Pathogen

a. Study of circulation

b. Study of nervous system

c. Substances that kill or prevent growth of microorganisms on living tissue

d. Study of bones

e. Study of joints

f. Study of bones

g. Any disease producing organisms

h. Any observable sign or evidence of disease

i. The entry and development of a pathogen in or on the body of an animal

j. Prevents infection by distribution of pathogenic microorganisms, usually applied inanimate objects

k. Functional disturbance usually manifested by physical signs (symptoms); a departure from normal.

l. Study of muscles and accessory organs such as tendons and ligaments

2. List five signs of good animal health

a.

b.

c.

d.

e.

TEST

3. List five signs of poor animal health.

    a.

    b.

    c.

    d.

    e.

4. List seven types of disinfectants and antiseptics

    a.

    b.

    c.

    d.

    e.

    f.

    g.

5. Name six characteristics of ideal disinfectants

    a.

    b.

    c.

    d.

    e.

    f.

6. Name five causes of infectious diseases.

    a.

    b.

    c.

TEST

d.

e.

7. Name five means of transmission of infectious agents

a.

b.

c.

d.

e.

8. Name five ways infections may enter the animal.

a.

b.

c.

d.

e.

9. State the normal temperature, pulse, and respiration rates of these farm animals.

	Normal Rectal Temperature		Normal Pulse Rate	Normal Breathing Rate
	Average	Range		
Cattle				
Sheep				
Goats				
Swine				
Horses				
Poultry				

TEST

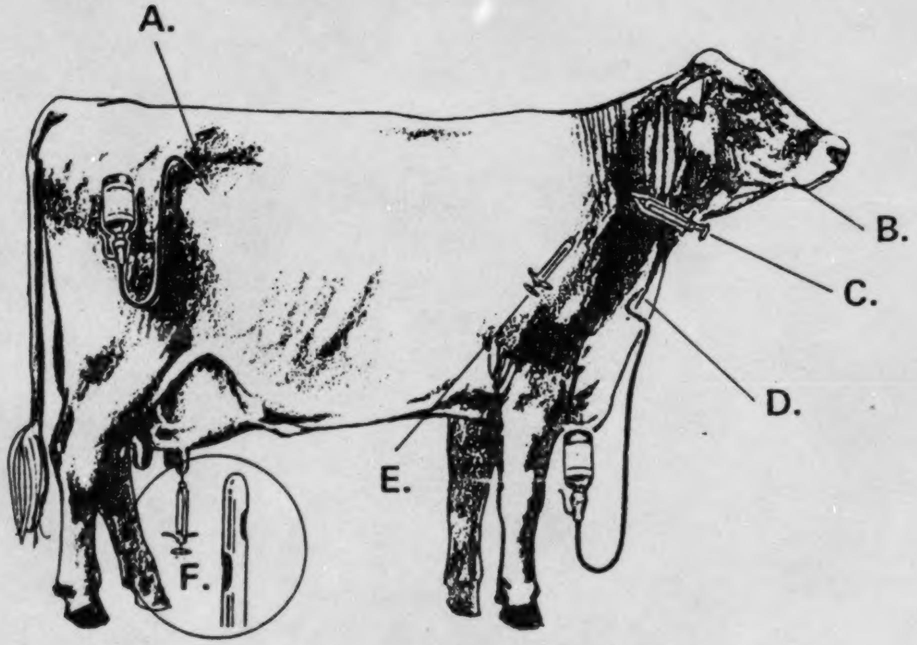
10. Discuss in writing methods of disease prevention through management and sanitation.

11. Discuss in writing the hazards of vaccinations.

12. Discuss in writing the application of vaccines in regard to purchase, use and record-keeping.

TEST

13. Identify the different types of injections:



A ______________________

B ______________________

C ______________________

D ______________________

E ______________________

F ______________________

ANIMAL HEALTH

UNIT I

ANSWERS TO TEST

1. 1. d
   2. f
   3. e
   4. l
   5. a
   6. b
   7. c
   8. j
   9. k
   10. i
   11. h
   12. g

2. Any five of the following:

   a. Contentment

   b. Alertness

   c. Cudding by ruminants

   d. Sleek hair coat

   e. Bright eyes and pink eye membranes

   f. Normal pulse rate, temperature, and breathing rate.

3. Any five of the following:

   a. Abnormal body temperature

   b. Inflamation - cardinal signs:
      1. Pain
      2. Heat
      3. Redness
      4. Swelling

   c. Anorexia

   d. Depression

   e. Lacrimation

   f. Diarrhea

4. Any seven of the following:

   a. Acids

   b. Alkalis

   c. Detergents

   d. Phenols, creosols, resorcinols, hexachlorophene

ANSWERS TO TEST

- e. Heavy metals
- f. Halogens
- g. Chlorohexidine
- h. Alcohols
- i. Aldehydes
- j. Dyes
- k. Physical disinfection

5. Any six of the following:
    - a. Good germicidal power - wide spectrum
    - b. Non toxic to higher life
    - c. Stability
    - d. Noncorrosive
    - e. Penetration
    - f. Homogenity
    - g. Solubility
    - h. Economical
    - i. Power to remove dirt and fatty substances
    - j. Deodorizing power

6. Any five of the following:
    - a. Genus
    - b. Breed
    - c. Genetic
    - d. Age
    - e. Sex
    - f. Nutritional
    - g. Endocrine
    - h. Trauma

7. Any five of the following:
    - a. Sexual contact
    - b. External parasites
    - c. Formites

ANSWERS TO TEST

- d. Excretions, secretions
- e. Food
- f. Airborne

8. Any five of the following:

- A. Exogenous
  - 1. Skin breaks
    - a. Bites - rabies
    - b. Needle teeth - erysipelas
    - c. Traumatic wounds - anthrax, blackleg
    - d. Insects, anaplasmosis
  - 2. Mucous membranes
    - a. Avitaminosis A - pinkeye
    - b. Injury (parasites) - hemorrhage, lumpy jaw
  - 3. Respiratory tract
    - a. Dust - shipping fever, TB
    - b. Moisture droplets - IBR
    - c. Exhaust fumes - shipping fever
  - 4. Genitourinary tract - coition, AI
    - a. Brucellosis
    - b. Vibrosis
    - c. Septospirosis
    - d. Vaginitis - IBR
  - 5. Eyes
    - a. Dust - pinkeye
    - b. Trauma - tail switching
  - 6. Intestinal tract
    - a. Licking - brucellosis, parasites
    - b. Trauma - traumatic gastritis
    - c. Toxins - enterotoxemia
- B. Endogenous
  - 1. Mastitis
  - 2. Enterotoxemia
  - 3. Tetanus
  - 4. Pasteurellosis

ANSWERS TO TEST

9.

Animal	Normal Rectal Temperature		Normal Pulse Rate	Normal Breathing Rate
	Average	Range		
	°F	°F	(min)	(min)
Cattle	101.5	100.4-102.8	60-70	10-30
Sheep	102.3	100.9-103.8	70-80	12-20
Goats	103.8	101.7-105.3	70-80	12-20
Swine	102.6	102 -103.6	60-80	8-13
Horses	100.5	99 -100.8	32-44	8-16
Poultry	106.0	105 -107	200-400	15-36

10. Discussion should include:
    - A. Newborn
        1. Preparation of prospective mother
        2. Post-parturient case of young
    - B. Additions to herd or flock
        1. Source
        2. Transportation
        3. Isolation
    - C. Housing
        1. Provide adequate space
        2. Location
        3. Ventilation
        4. Sanitation and disinfection
    - D. Nutrition
        1. Provide balanced rations - prevents stress, promotes adequate lactation, disease prevention.
    - E. Disposal of dead animals and birds
        1. Burn completely
        2. Bury - four feet of earth covering animal
        3. Rendering plant
        4. Never feed dead birds or animals to swine
        5. Remove dead animals from water run-off areas

ANSWERS TO TEST

11. Discussion should include:
    - A. Attenuated
        1. Reversion to virulence
        2. Disease transmission
        3. Severe reactions - disease outbreaks
        4. Abortions
        5. Fetal defects
        6. Potential transmission to humans
        7. Stress and latent infection
        8. Deterioration
            - a. Storage
            - b. Preparation - administration
        9. Contamination
    - B. Inactivated
        1. Few reactions
        2. Irritations
            - a. Vehicle
            - b. Tissue medium - postvaccinal encephalitis
    - C. Antiserum
        1. Infection - spread of disease; hepatitis
        2. Anaphylactic shock

12. Discussion should include:
    - A. Purchase of vaccines
        1. Purchase vaccines only from sources maintaining refrigerated storage
        2. Purchase vaccines with sufficient expiration dates for your future use; purchase only quantity needed for immediate needs
        3. Transport attenuated vaccines out of sun and keep them refrigerated
        4. Store all vaccines in refrigerator until ready to use
        5. Purchase and use only vaccines that are useful under your husbandry program

ANSWERS TO TEST

B. Using vaccines
  1. Use sterile equipment
    a. Boil syringes and needles for 30 minutes
    b. Never use chemical disinfectants on equipment when administering attenuated vaccines - destroy living agent
    c. Chemical disinfection satisfactory for inactivated vaccines, antiserums, and toxoids
  2. Keep attenuated vaccines on ice and out of sun until administered
  3. Use sterile techniques during administration
    a. Disinfect vial stoppers with alcohol before needle penetration
    b. Use separate needle for filling syringe and for administration
  4. Never freeze vaccines
  5. Read labels before use - follow instructions
  6. Shake thoroughly before use
  7. Discard partially used containers - avoid contamination
  8. Destroy empty attenuated vaccine containers

C. Records
  1. Keep one or two unused vials of vaccine - under refrigeration
    a. Provides source of test material if unsatisfactory results occur
    b. Provides source for records of expiration data, serial number, and manufacturer
  2. Record
    a. Date used
    b. Number and identification of vaccinated animals
    c. Source of supply
    d. Expiration date of vaccine
    e. Serial number of vaccine
    f. Manufacturer of vaccine
    g. Dosage administered
    h. Reactions following administration, if observed

ANSWERS TO TEST

13. A. Intraperitoneal
    B. Oral
    C. Intramuscular
    D. Intravenous
    E. Subcutaneous
    F. Udder

ANIMAL HEALTH

UNIT II

REPRODUCTIVE DISEASES OR CONDITIONS

TERMINAL OBJECTIVE

Upon completion of this unit, students will be able to match terms dealing with reproductive disorders and complete a chart on reproductive disorders.

SPECIFIC OBJECTIVES

After completion of this unit, the student will be able to:

1. Match terms associated with reproductive disorders
2. Complete a chart on reproductive disorders concerning species, cause, symptoms, prevention, and/or treatment
3. List five miscellaneous conditions of reproduction and parturition.
4. List the normal time for delivery from onset of labor for common farm animals

ANIMAL HEALTH

UNIT II

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheet
2. Provide students with Information Sheets
3. Discuss Terminal and Specific Objectives with students
4. Discuss Information Sheets
5. Give Test

Students:

1. Read Objective Sheet
2. Study Information Sheets
3. Take Test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objective Sheet
2. Information Sheets
3. Test
4. Answers to Test

References:

1. Beef Cattle Production, Kenneth A. Wagnon, Reuben Albaugh, George H. Hart, The MacMillan Company, New York, New York.
2. Swine Production, Clarence E. Bundy, Ronald V. Diggins, Prentice-Hall, Inc., Englewood Cliffs, New Jersey.
3. The Stockman's Handbook, M.E. Ensminger, The Interstate Printers and Publishers, Inc., Danville, Illinois.

INSTRUCTIONAL MATERIALS

4. OSU Extension Facts "Beef Cattle Parasite Control", Sidney E. Kung, Oklahoma State University, Stillwater, Oklahoma.

5. Lecture outline of Preventive Veterinary Medicine, I.A. Schipper, 5th Edition. Burger Publishing Co., Minneapolis, Minnesota.

ANIMAL HEALTH

UNIT II

INFORMATION SHEET

I. Terms and Definitions

A. Brucellosis - An infectious type of abortion caused by an organism known as brucella species

B. Leptospirosis - An infectious disease causing abortion

C. Vibriosis - A disease of the reproductive tract of cattle and sheep which is characterized by abortion

D. Trichomoniasis - A true venereal disease of cattle

E. Vaginitis - An infectious disease which localizes in the lining of the vagina

F. Cryptorchidism - Failure of testicle to descend to the scrotum

G. Freemartin - Female twin to a bull calf

H. Vaginal prolapse - Walls of the uterus or vagina are pushed out through the lips of the vulva

I. Mastitis - An inflamation of the mammary gland due to the presence of an organism

J. Ketosis - A metabolic disorder of cattle with an increase of ketone bodies in the milk, blood, and urine.

K. Milk fever - A paralysis and loss of consciousness with final coma. Usually seen in dairy cattle at parturition, No fever. All breeds susceptible.

L. Agulactia - Without milk

M. Retained placenta - Failure to clear after birth

INFORMATION SHEET

II. Reproductive Diseases or Disorders

DISEASE OR CONDITION	SPECIES	CAUSE	SYMPTOMS	PREVENTION OR TREATMENT
Cryptorchidism	Horses, cattle most common; hogs, sheep	Anatomical Defect	Failure of testicle to descend to the scrotum	Hereditary - should not be used for breeding
Freemartin	Cattle	Anatomical Defect	Female twin to a bull calf. Non breeders - reproductive organs small; animal assumes general appearance of a steer	Cull
Vaginal Prolapse	All species	Anatomical Defect Feeding estrogen, moldy feeds.	Walls of the uterus or vagina are pushed out through the lips of the vulva.	Call veterinarian Fertility may or may not be affected Advisable to cull
Brucellosis (Bang's disease, undulant fever,)	Cattle, sheep, swine, and men	Infectious	Abortion; retained placenta, repeat breeders	Slaughter infected animals; calfhood vaccinate; A.I.
Leptospirosis	Cattle, sheep, swine, and men	Infectious	Abortion; loss of appetite, feverish; heavy breathing; bloody urine; calves may be born but are weak, death may occur.	Blood test; vaccinate all animals; isolate new animals; A.I.

INFORMATION SHEET

DISEASE OR CONDITION	SPECIES	CAUSE	SYMPTOMS	PREVENTION OR TREATMENT
Vibriosis	Cattle and sheep	Infectious	Abortion; low conception; temporary infertility	No treatment available; use antibiotics; sexual rest; A.I.
Trichomoniasis	Cattle	Infectious	Abortion; low conception; repeat breeding; inflammation of uterus	Sexual rest cows for 3 months after abortion; market infected bulls; A.I.
Vaginitis	Cattle	Infectious	Tissue of vagina reddish; roughened, and granular in appearance	Artificial insemination; purchase clean animals
Retained Placenta	Cattle primarily	Increased with multiple births; premature delivery; difficult delivery; endocrine deficiencies	Placenta not expelled; straining; characteristic odor.	Prevention: Breed at suitable size, age, Good nutrition, avoid infections, avoid injury. Treatment: Do not attempt manual removal for 24-72 hours postpartum; Do not breed for 90 days. Observe extended expulsion of secretions; Do not cut off placenta; do not tie weight onto placenta, oxytocin may aid in expulsion.

INFORMATION SHEET

DISEASE OR CONDITION	SPECIES	CAUSE	SYMPTOMS	PREVENTION OR TREATMENT
Infectious Bovine Rhinotracheitis (IBR, Rednose, IPV) (IPV Infectious Vulvovaginitis)	Cattle	Crowded conditions, nasal secretions; Vaginal secretions, Semen, Placental fluids and aborted fetuses, urine	Respiratory (IBR, Rednose); Elevated temperature; nasal discharge, Increased respiratory rate, profuse salivation; (IPV) Swelling of vulva, vaginal mucous red, abortion; encephalitis, pinkeye, mastitis	Prevention: Avoid close contact. Watch for signs of infection; isolate suspects, do not breed with infected bulls. Vaccines Treatment: No treatment for viral infection. Chemo-therapeutic drugs to control secondary infections.
Mastitis	All species	Trauma, cold, dampness, drafts, edema, Poor management. Various bacteria, molds, yeasts. Viruses.	Abnormal milk, swollen quarter or gland; Gland hot and red, Above normal temperature, Anorexia, depression, decreased milk production, Death.	Prevention: Good management, employ same dairy practices; Treatment: milk out infected quarter completely at one hour intervals; Contact veterinarian early; Intramammary medication; Parenteral medication.
Ketosis	Cattle	Faulty carbohydrate metabolism, heavily fed cattle, starvation, stress, inheritance	Gradual anorexia, loss in condition; Decreased milk flow, constipation, sucking tongue, walking in circles; milk fever type.	Prevention: Feeding of molasses; sodium acetate orally, cobalt. Feed high energy ration before and after calving. Treatment: Dextrose IV; Veterinarian examination; Cortisone, ACTH.
Milk fever	Dairy Cattle	May occur 15 days before calving; Too little calcium; Faulty assimilation; Inheritance.	Depression; excitment; Muscular twitching; Paralysis; Coma.	Prevention: Avoid complete milking out for several days following parturition. Increase phosphorus and decrease calcium during dry period; Administer Vitamin D 5-7 days prepartum; Forced air into udder. Treatment: Calcium gluconate IV and IP.

INFORMATION SHEET

DISEASE OR CONDITION	SPECIES	CAUSE	SYMPTOMS	PREVENTION OR TREATMENT
Agalactia	Cattle Swine	Hormonal deficiency; mastitis; heredity; metritis; length of dry period, closed teat, may be MMA complex; overfeeding.	Failure of production or letdown of milk.	Provide proper ration; Endocrines for production and letdown; massage, tranquilizers.
Metritis	All species	Inflammation of uterine and vaginal wall	Discharge of pus; foul odor of uterine discharge; large, flabby uterus; retained fetal membranes, repeat breeders.	Careful sanitation at calving; antibiotic treatment, A.I.

INFORMATION SHEET

III. Miscellaneous Conditions of Reproduction and Parturition

  A. Balantis - Infection of glans, penis, prepuce, and sheath

  B. Cystic ovary - Constant heat

  C. Persistant Corpus Luteum - Breeding difficulty

  D. Metritis - Infection of uterus

  E. Uterine Torsion - revolution of uterus on its long axis

  F. Rupture of Prepubic Tendons - Occurs usually in pregnant animals

  G. Mumification of fetuses

  H. Torsion of umbilical cord

  I. Dystocia - difficult delivery

IV. Normal Time for Delivery from Onset of Labor

  A. Cow - Less than eight hours

  B. Ewe - One to two hours

  C. Mare - One to three hours

  D. Sow - One pig/hour

ANIMAL HEALTH

UNIT II

TEST

1. Match terms and definitions

_____a. Brucellosis

_____b. Leptospirosis

_____c. Vibriosis

_____d. Trichomoniasis

_____e. Vaginitis

_____f. Crytorchidism

_____g. Freemartin

_____h. Vaginal prolapse

_____i. Mastitis

_____j. Ketosis

_____k. Milk fever

_____l. Agalactia

_____m. Retained placenta

1. Failure to clear after birth
2. Without milk
3. Female twin to a bull calf
4. Failure of testicle to descend to the scrotum
5. An infectious disease causing abortion
6. An infectious type of abortion caused by organisms known as brucella species.
7. Walls of the uterus or vagina are pushed out through the lips of the vulva
8. A metabolic disorder of cattle with an increase of ketone bodies in the milk, blood, and urine
9. A paralysis and loss of consciousness with final coma. Usually seen in dairy cattle at parturition
10. An infectious disease which localizes in the lining of the vagina.
11. A true venereal disease of cattle
12. A disease of the reproductive tract of cattle and sheep which is characterized by abortion
13. An inflammation of the mammary gland due to the presence of an organism.

2. Complete the following chart:

Disease	Species	Cause	Symptoms	Treatment and control
Brucellosis		Infectious		
Leptospirosis	Cattle, sheep, swine, man.			
Vibriosis			Abortion, Low Conception; temporary infertility	
Trichomoniasis				Market infected bulls
Vaginitis			Tissue of vagina reddish	

TEST

3. List five miscellaneous conditions of reproduction and parturition.

   a.

   b.

   c.

   d.

   e.

4. List the normal time for delivery from onset of labor of common farm animals.

   a. Cow ____________________________________

   b. Ewe ____________________________________

   c. Mare ____________________________________

   d. Sow ____________________________________

ANIMAL HEALTH

UNIT II

ANSWERS TO TEST

1. a. 6
   b. 5
   c. 12
   d. 11
   e. 10
   f. 4
   g. 3
   h. 7
   i. 13
   j. 8
   k. 9
   l. 2
   m. 1

2.

Disease	Species	Cause	Symptoms	Treatment and Control
Brucellosis	Cattle, sheep, swine and men	Infectious	Abortion, retained placenta, repeat breeders	Slaughter infected animals; calfhood vaccinate; AI.
Leptospirosis	Cattle, sheep swine and men	Infectious	Abortion; loss of appetite; feverish; heavy breathing; bloody urine; calves may be born but are weak, death may occur.	Blood test; vaccinate all animals; isolate new animals; AI.
Vibriosis	Cattle and sheep	Infectious	Abortion, low conception; temporary infertility	No treatment available; use antibiotics; sexual rest;AI.
Trichomoniasis	Cattle	Infectious	Abortion; low conception; repeat breeding; inflammation of uterus	Sexual rest cows for 3 months after abortion; market infected bulls; AI.
Vaginitis	Cattle	Infectious	Tissue of vagina reddish; roughened; and granular in appearance	Artificial insemination; purchase clean animals.

ANSWERS TO TEST

3. Any five of the following:
   - a. Balantis - Infection of glans, penis, prepuce, and sheath
   - b. Cystic ovary - Constant heat
   - c. Persistant corpus luteum - Breeding difficulty
   - d. Metritis - Infection of uterus
   - e. Uterine Torsion - revolution of uterus on its long axis
   - f. Rupture of prepubic tendons - Occurs usually in pregnant animals
   - g. Mumification of fetuses
   - h. Torsion of umbilical cord
   - i. Dystocia - difficult delivery

4. a. Cow - Less than eight hours
   - b. Ewe - One to two hours
   - c. Mare - One to three hours
   - d. Sow - One pig/hour

ANIMAL HEALTH

UNIT III

DIGESTIVE AND NUTRITIONAL DISEASES AND DISORDERS

TERMINAL OBJECTIVE

Upon completion of this unit, the student will be able to complete a chart on diseases and disorders and list five plants poisonous to livestock. This will be evidenced by scoring eighty five percent on the post test.

SPECIFIC OBJECTIVES

After completion of this unit, the student will be able to:

1. Match terms associated with digestive and nutritional diseases and disorders
2. Complete a chart on digestive and nutritional diseases and disorders
3. List five poisonous plants and species of livestock affected

ANIMAL HEALTH

UNIT III

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheet
2. Provide students with Information Sheets
3. Discuss Terminal and Specific Objectives with students
4. Discuss Information Sheets
5. Give Test

Students:

1. Read Objective Sheet
2. Study Information Sheets
3. Take Test

INSTRUCTIONAL MATERIALS

Included in this unit;

1. Objective Sheet
2. Information Sheets
3. Test
4. Answers to Test

References:

1. Beef Cattle Production, Kenneth A. Wagnon, Reuben Albaugh, George H. Hart, The MacMillam Company, New York, New York.
2. Swine Production, Clarence E. Bundy, Ronald V. Diggins, Prentice-Hall, Inc., Englewood Cliffs, New Jersey.
3. The Stockman's Handbook, M.E. Ensminger, The Interstate Printers and Publishers, Inc., Danville, Illinois.
4. OSU Extension Facts "Beef Cattle Parasite Control", Sidney E. Kung, Oklahoma State University, Stillwater, Oklahoma.

INSTRUCTIONAL MATERIALS

5. Lecture outline of Preventive Veterinary Medicine, I.A. Schipper, 5th edition, Burgess Publishing Co., Minneapolis, Minnesota.

ANIMAL HEALTH

UNIT III

INFORMATION SHEET

I. Terms and Definitions

   A. Stomatitis - Inflammation of the mucous membrances of the oral cavity

   B. Choke - Obstruction of the esophagus

   C. Nitrate poisoning - over consumption of nitrate containing feeds

   D. Bloat - gas formation exceeds gas elimination

INFORMATION SHEET

II. Digestive and Nutritional Diseases and Disorders

DISEASES OR DISORDERS	SPECIES	CAUSE	SYMPTOMS	PREVENTION AND/OR TREATMENT
Stomatitis	Cattle, Sheep	Foreign bodies, Chemicals, Rank pasture, growth, allergic	Inflammation of the mucous membranes of the oral cavity; Skin lessions on dewlap, legs, abdomen, and udder	Avoid injury to oral cavity, Remove feed cause allergic reaction, Obtain veterinary services
Rickets	Cattle, sheep, swine, horses	Lack of sunlight, Improper calcium and phosphorus	Enlargement of the knee and hock joints; bowed legs	Provide sufficient calcium, phosphorus and Vitamin D. Provide adequate sunlight.
Traumatic gastritis (hardware disease)	Cattle, dairy	Perforation of ruminal or recticular wall by a sharp object	Decreased milk flow; Anorexia; constipation or diarrhea; Increased temperature; exhibition of pain.	Prevention: Careful handling of sharp objects; placing of magnets of feed grinding equipment; stomach magnets. Treatment: Prevention most important. Surgery.
Bloat (tympanitis)	Cattle; Sheep	Gas formation exceeds gas elimination; Hereditary; Nitrate poisoning.	Fullness high in left flank area; Uneasiness; Respiration increased; Death	Prevention: Provide adequate minerals, maintain high soil fertility. Treatment: Exercise, stomach tube, turpentine or Kerosine orally (use with caution) Trocarization of rumen.

INFORMATION SHEET

DISEASES OR DISORDERS	SPECIES	CAUSE	SYMPTOMS	PREVENTION AND/OR TREATMENT
Nitrate poisoning	Ruminants predominantly, Swine, poultry	Consumption of nitrate-containing food (fertilizers, nitrate concentration in plants, acid soils, increased phosphates retards accumulation of nitrates	Bloat; decreased milk production; staggering; abortion; infertility; death; slow body movement.	Prevention: Test suspect forages; Increase concentrates in ration; Contact veterinarians
Enteric Infections (Scours, diarrhea, enteritis, bloody scours, white scours)	Swine (TGE Transmissible gastroenteritis) (SMEDI Enteroviruses) Cattle and calves Sheep	Nutritional Management; Failure to obtain colostrum	Diarrhea; Dehydration; Elevated temperature; Rapid weight loss; Pneumonia symptoms; Death	Prevention: Swine: Dip navel; Prevent agalactia; Avoid hypernutrition of sow. Dry well-ventilated pens; Provide supplementary heat. Calves: Dip navel; Provide colostrum, avoid overconsumption of milk. Dry well-bedded pens. Sanitation. Treatment: Chemotherapeutic agents; electrolytes.

INFORMATION SHEET

DISEASES OR DISORDERS	SPECIES	CAUSE	SYMPTOMS	PREVENTION AND/OR TREATMENT
Transmissible Gastroenteritis (TGE)	Swine	Carries - dogs, cats, starlings, greater during cold weather. Primarily nursing age.	12 to 18 hours. Entire herd within several days, vomitting, watery yellowish diarrhea, rapid dehydration, high morbidity; high mortality, Pigs over 3 weeks of age will survive feeder pigs - severe loss of weight. Sows - elevated temperature, vomitting, diarrhea.	No treatment Prevention: Reoovered sow has amunities for 9-12 months; Pig must nurse at 1-2 hour intervals; Vaccination; sanitation; interrupt farrowing for 4 weeks, keep dogs, cats and birds away from hogs
Enterotoxemia	Sheep, Calves, Swine	Overeating, dam produces abundance of milk	Rapid death - no symptoms, convulsions; walking in circles; diarrhea, vomitting.	Prevention: Vaccines Treatment: Increase roughage. Stop all concentrates
Bovine virus diarrhea (BUD)	Cattle	Inclement weather, contaminated feed or water, Wild animals, birds, and flies.	Diarrhea; anorexia, salivation; dehydration, coughing, nasal discharge, Rapid weight loss; abortions, death.	Prevention: Isolate new animals 30 days; Do not mix vaccinated and unvaccinated animals; Immunization.
Grass tetany	Cattle, Sheep	Rapid consumption of high nitrogen feeds	Nervousness; weight loss; convulsions, death	Prevention: Soil fertilization, Supplement magnesium to ration. Treatment: Calcium and magnesium

INFORMATION SHEET

DISEASES OR DISORDERS	SPECIES	CAUSE	SYMPTOMS	PREVENTION AND/OR TREATMENT
Laminitis	Horses, Cattle, Sheep	Overfed, Underworked; Injestion of cold water by overheated animal, Hard surface roads	Difficult movement; Feet hot, foot deformity, labored breathing.	Prevent stress 1. Overeating 2. Overwork 3. Toxemia Prevent injury

INFORMATION SHEET

III. Plants Poisonous to Livestock

PLANT	ANIMALS AFFECTED	TOXIC PART OF PLANT	COMMON LOCATION	TOXIC SIGNS
Whorled Milkweed (Galioides)	Cattle, Sheep	Leaves, stems	Dry plains and foothills from Kansas to California	Incoordination, depression, shallow repiration, inability to stand, coma.
Nightshade, Black (Solanum nigrum)	Cattle, Sheep	Green fruit, leaves	Generally throughout the U.S.	Marked thirst, diarrhea, loss of appetite, general body weakness, irregular gait, inability to stand, coma.
Poisonhemlock (Conium maculatum)	Sheep, cattle, horses,	Fruit, leaves	Throughout the U.S.	Twitching muscles, progressive weakness, rapid and shallow respiration, coma. If ingested during pregnancy may cause congenital anomalies.
Saltbrush	Cattle, Sheep, Horses	Leaves, stems	Western range areas	Acute toxicity, acute hemorrhagic enteritis, Chronic disease, liver and central nervous system damage
Waterhemlock (Cicuta spp).	All species	Root, rootstalks, occasionally ground stem	Wet seepage areas throughout U.S.	Violent spasms resulting in rapid respiration and heart rate, coma, death.
Choke Cherry (Prunus spp)	Cattle, Sheep	Leaves	Along hillsides and streams throughout U.S.	Rapid and labored breathing, venous blood bright red in color, coma, death.

INFORMATION SHEET

PLANT	ANIMALS AFFECTED	TOXIC PART OF PLANT	COMMON LOCATION	TOXIC SIGNS
Cocklebur (Xanthium spp.)	Horses, Swine, Cattle	First leaves of seedings and seeds	Low, wet areas of western U.S.	Red coloration of lining of the mouth; labored,rapid breathing, inability to stand, depression, coma, death.
Bracken Fern (Pteridium aquilinum)	Cattle, Horses	Leaves	Throughout the U.S.	Light coloration of mouth lining and eyes, general weakness, anemia, blood in urine and feces, massive hemorrhages in body.
Goldenrod (Solidago spp.)	Cattle, Sheep	Leaves, stems	Western U.S.	Depression, irregular gait, abortion, inability to stand
Locoweeds (Astragalus spp. Oxytropis spp.)	Sheep, Cattle, Horses	Leaves, stems	Plains and valleys of western U.S.	Depression, tendency to wander, loss of weight, stilted gait, loss of instinct of animals to stay together, marked central nervous system disturbances, abortion, congenital malformations. If ingested during pregnancy, may cause congenital anomalies.

ANIMAL HEALTH

UNIT III

TEST

1. Match terms and definitions

______A. Stomatitis

______B. Nitrate poisoning

______C. Bloat

1. Gas formation exceeds gas elimination

2. Over consumption of nitrate containing feeds

3. Inflammation of the mucous membranes of the oral cavity

2. Complete the following chart on digestive and nutritional diseases and disorders.

Disease or Disorder	Species	Cause	Symptoms	Prevention or treatment
Hardware disease	Dairy cattle			
Bloat		Gas		
Nitrate poisoning			Bloat, staggering, abortion, death	
TGE				Limited treatment only. Prevention
BVD	Cattle			
Grass Tetany		Rapid consumption of high nitrogen feed		
Founder			Foot deformity	

3. List 5 poisonous plants and species of livestock affected.

Poisonous Plants	Species affected
A. ______________	______________
B. ______________	______________

TEST

	Poisonous Plants	Species affected
C.	________________	________________
D.	________________	________________
E.	________________	________________

ANIMAL HEALTH

UNIT III

ANSWERS TO TEST

1. A. 3
   B. 2
   C. 1

2.

Disease or Disorders	Species	Cause	Symptoms	Prevention and/ or Treatment
Hardware disease	Cattle, dairy	Perforation of ruminal wall by a sharp object	Decreased milk flow, constipation or diarrhea, Increased temperature.	Prevention: Placing of magnets of feed grinding equipment; stomach magnets.
Bloat	Cattle, Sheep	Gas	Fullness high in left flank area	Stomach tube
Nitrate poisoning	Ruminants	Consumption of nitrate-containing food	Bloat	Prevention: Test suspect forages. Contact veterinarians
Transmissible Gastroenteritis (TGE)	Swine	Carried by dogs, cats, starlings, greater during cold weather	Vomitting, watery yellowish diarrhea, rapid dehydration. Pigs over 3 weeks of age will survive	Limited treatment. Recovered sow has ammunities for 9-12 months
Bovine Virus Diarrhea (BUD)	Cattle	Contamination feed or water, Wild animals, birds, & flies	Diarrhea, anorexia, Salivation, Dehydration.	Prevention: Isolate new animals 30 days,
Grass Tetany	Sheep Cattle,	Rapid consumption of high nitrogen feeds	Nervousness, Weight loss, Convulsions, death	Prevention: Soil fertilization, Supplement magnesium to ration Treatment: Calcium and magnesium
Laminitis (founder)	Horses Cattle Sheep	Overfed, underworked, Injestion of cold water by overheated animals	Difficult movement, feet hot, Foot deformity	Prevent stress 1. overeating 2. Overwork 3. Toxemia

ANSWERS TO TEST

3. Any five of the following:

a. whorled milkweed	cattle, sheep
b. Black Nightshade	cattle, sheep
c. Poison hemlock	cattle, sheep, horses
d. Saltbrush	cattle, sheep, horses
e. Water hemlock	all species
f. Choke cherry	cattle, sheep
g. Cocklebur	horses, swine, cattle
h. Bracken fern	cattle, horses
i. Goldenrod	cattle, sheep
j. Locoweeds	sheep, cattle, horses

ANIMAL HEALTH

UNIT IV

RESPIRATORY DISEASES

TERMINAL OBJECTIVE

Upon completion of this unit, the student should be able to name the parts of the respiratory tract and complete a chart on respiratory diseases. This will be evidenced by scoring eighty-five percent on a post test.

SPECIFIC OBJECTIVES

After completion of this unit, the student will be able to:

1. Match terms concerning the respiratory system
2. Name the parts of the respiratory system
3. Name five factors that will influence the respiratory system of an animal
4. Complete a chart of the respiratory diseases

ANIMAL HEALTH

UNIT IV

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheet
2. Provide students with Information Sheets
3. Discuss Terminal and Specific Objectives with students
4. Discuss Information Sheets
5. Give Test

Students:

1. Read Objective Sheet
2. Study Information Sheets
3. Take Test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objective Sheet
2. Information Sheets
3. Test
4. Answers to Test

References:

1. Beef Cattle Production, Kenneth A. Wagnon, Reuben Albaugh, George H. Hart, The MacMillam Company, New York, New York.
2. Swine Production, Clarence E. Bundy, Ronald V. Diggins, Prentice-Hall Inc., Englewood Cliffs, New Jersey.
3. The Stockman's Handbook, M.E. Ensminger, The Interstate Printers and Publishers, Inc., Danville, Illinois.
4. OSU Extension Facts "Beef Cattle Parasite Control" Sidney E. Kung, Oklahoma State University, Stillwater, Oklahoma.

INSTRUCTIONAL MATERIALS

5. Lecture outline of Preventive Veterinary Medicine, I.A. Schipper, 5th Edition, Burgess Publishing Co., Minneapolis, Minnesota.

ANIMAL HEALTH

UNIT IV

INFORMATION SHEET

I. Terms and Definitions

  A. Shipping fever - Stockyards pneumonia

  B. Swine influenza - A condition brought on by parasitism and poor management in swine.

  C. Tuberculosis - A disease that affects the respiratory tract of animals. Very few symptoms of diagnosis.

II. Parts of the Respiratory System

  A. Air passages

    1. Nasal cavity

    2. Pharynx

    3. Larynx

    4. Trachea

    5. Bronchi

    6. Air sac

    7. Pneumatic

  B. Lungs

  C. Thoracic cavity

  D. Pleura

III. Respiration Rate Affected by

  A. Excitement

  B. Exercise

  C. Fever

  D. Pain

  E. Environmental temperature and humidity

INFORMATION SHEET

IV. Respiratory Diseases and Disorders

DISEASE OR DISORDER	SPECIES	CAUSE	SYMPTOMS	PREVENTION AND/OR TREATMENT
Atrophic Rhinitis	Swine	Environment, Infections, Lung worm, Infestation	Temperature elevation, Nasal discharge, Coughing, Dyspnea	Avoid cold, dampness, exposure. Provide good ventilation; Sufficient vitamin A.
Tuberculosis	All Species	Contamination of feed or water; Wild birds	Elevated temperature, fatique, depression, coughing, weight loss	Test all livestock annually; Keep poultry away from other livestock. Treatment: Not of practical value for livestock or poultry.
Pneumonia	All Species	Stress, Environmental conditions	Coughing, Labored breathing; Death	Good Management Antibiotics
Swine Influenza (Hog flu)	Swine	Gram-negative bacterium, Lung worm, Earthworm, Poor housing, Nutrition, Parasitism	Elevated temperature 104-107°F Sneezing, Nasal Discharge, Depression, Weight loss	Sanitation. Isolate new animals 30 days Provide palatible ration and plenty of fresh clean water Immunization of no value

INFORMATION SHEET

DISEASE OR DISORDER	SPECIES	CAUSE	SYMPTOMS	PREVENTION AND/OR TREATMENT
Shipping fever	Cattle	Gram negative bacteria; Viruses	Nasal discharge; Dyspnea, elevated temperature 104-107°F Anorexia, Prostration, Lacrimation, Diarrhea, death.	Immunization before shipping, Avoid stress during transportation; Good housing; Antibiotics
Infectious Bovine Rhinotrachetitis (IBR, Rednose)		See Unit on Reproduction		

ANIMAL HEALTH

UNIT IV

TEST

1. Match the following terms and definitions:

_____A. Shipping fever

_____B. Swine Influenza

_____C. Tuberculosis

1. A disease that affects the respiratory tract of animals. Very few symptoms of diagnosis.

2. Stockyard pneumonia

3. A condition brought on by parasitism and poor management in swine.

2. Name the parts of the respiratory system.

A.

1.

2.

3.

4.

5.

6.

7.

B.

C.

D.

3. Name five factors that will influence the respiratory system of an animal.

A.

B.

C.

D.

E.

TEST

4. Complete the following chart of respiratory diseases.

DISEASE OR DISORDER	SPECIES	CAUSE	SYMPTOMS	PREVENTION AND/OR TREATMENT
Atrophic Rhinitis				
Pneumonia				
Tuberculosis				
Shipping Fever				

ANIMAL HEALTH

UNIT IV

ANSWERS TO TEST

1. A. 2
   B. 3
   C. 1

2. A. Air passages
      1. Nasal cavity
      2. Pharynx
      3. Larynx
      4. Trachea
      5. Bronchi
      6. Air sac
      7. Pneumatic
   B. Lungs
   C. Thoracic cavity
   D. Pleura

3. A. Excitement
   B. Exercise
   C. Fever
   D. Pain
   E. Environmental temperature and humidity

ANSWERS TO TEST

4.

DISEASE OR DISORDER	SPECIES	CAUSE	SYMPTOMS	PREVENTION AND/OR TREATMENT
Atrophic Rhinitis	Swine	Environment, Infections, Lung worm, Infestation	Temperature elevation, Nasal discharge, Coughing, Dyspnea	Avoid cold, dampness, exposure. Provide good ventilation, Sufficient vitamin A.
Pneumonia	All Species	Stress, Environmental conditions	Coughing, Labored breathing, Death	Good Management Antibiotics
Tuberculosis	All Species	Contamination of feed or water; Wild birds	Elevated temperature, fatique, depression, coughing, weight loss	Test all livestock annually; Keep poultry away from other livestock. Treatment: Not of practical value for livestock or poultry.
Shipping fever	Cattle	Gram-negative bacteria; Viruses	Nasal discharge; Dyspnea, elevated temperature 104-107^{o}F, Anorexia, Prostration, Lacrimation Diarrhea, death.	Immunization before shipping, Avoid stress during transportation; Good housing; Antibiotics

ANIMAL HEALTH

UNIT V

CIRCULATORY DISEASES

TERMINAL OBJECTIVE

Upon completion of this unit, the student will be able to match terms concerning the circulatory system, list the major parts, and list the functions of blood. He (she) should also be able to list and discuss the diseases or conditions related to the circulatory system. This will be evidenced by scoring eighty-five percent on the post test.

SPECIFIC OBJECTIVES

After completion of this unit, the student will be able to:

1. Match terms to the proper definition concerning the circulatory system, diseases, and/or conditions.

2. Name the three major parts of the circulatory system

3. List five functions of blood

4. Name five types of shock

5. List four symptoms of shock

6. Complete a chart of circulatory diseases or conditions dealing with species, causes, symptoms, preventions and/or treatments.

ANIMAL HEALTH

UNIT V

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheet
2. Provide students with Information Sheets
3. Discuss Terminal and Specific Objectives with students
4. Discuss Information Sheets
5. Give Test

Students:

1. Read Objective Sheet
2. Study Information Sheets
3. Take Test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objective Sheet
2. Information Sheets
3. Test
4. Answers to Test

References:

1. Beef Cattle Production, Kenneth A. Wagnon, Reuben Albaugh, George H. Hart, The MacMillam Company, New York, New York.

2. Swine Production, Clarence E. Bundy, Ronald V. Diggins, Prentice-Hall, Inc., Englewood Cliffs, New Jersey.

3. The Stockman's Handbook, M. E. Ensminger, The Interstate Printers and Publishers, Inc., Danville, Illinois.

4. Lecture Outline of Preventive Veterinary Medicine, I.A. Schipper, 5th Edition, Burgess Publishers Co., Minneapolis, Minnesota.

ANIMAL HEALTH

UNIT V

INFORMATION SHEET

I. Terms and Definitions

   A. Shock - Circulatory deficiency, characterized by decreased blood flow

   B. Anaplasmosis - A circulatory disease caused by insects sometimes called gallsickness

   C. Anemia - A circulatory disease caused by a lack of iron

   D. Leukemia - A fatal malignant disease caused by extensive production of immature leucocytes and characterized by tumors of the lymph glands

   E. Edema - Accumulation of lymph tissue

II. Major Parts of the Circulatory System

   A. Heart

   B. Vessels

   C. Blood

III. Functions of Blood

   A. Distribution of nutrients

   B. Exchange of oxygen and carbon dioxide

   C. Removal of wastes

   D. Distributes endocrine secretions

   E. Fluid distribution

   F. Regulation of body temperature

   G. Regulation of pH

   H. Defense against infection

INFORMATION SHEET

IV. Five Types of Shock

- A. Traumatic
- B. Surgical
- C. Hemorrhagic
- D. Toxemia
- E. Sensitization

V. Symptoms of Shock

- A. Lowered body temperature
- B. Tremors
- C. Pallor
- D. Rapid respiration

INFORMATION SHEET

VI. Circulatory Diseases

DISEASE OR DISORDER	SPECIES	CAUSE	SYMPTOMS	PREVENTION AND/OR TREATMENT
Anaplasmosis	Cattle, Sheep	Blood sucking insects and anthropods, Mechanical transmission	Elevated temperature; Anorexia; Agalactia; Depression; Dyspnea, Anemia, Constipation, or diarrhea. Subcutaneous hematomas, Death (20-50%)	Insect control, disinfect all instruments used to penetrate skin; Isolate all sick animals; vaccination low level feeding of tetracyclines; Treatment: Chlorotetracycline; blood transfussions, electrolytes
Anemia	Young swine primarily Calves, Lambs, and colts	Sow's milk deficient in iron, confinement, Failure to supplement baby pigs with iron	Fatique: Dyspnea, (Thumps); Depression; Poor growth; Edema; Rapid pulse	Addition of iron or copper to diet of suckling pigs; Soil placed in pen once a week
Eperythrozoonis	Young swine	Blood sucking anthropods; contaminated instruments	Elevated temperature; Icterus or pallor, Anemia, Depression, Anorexia.	Control of blood sucking animals, Use clean instruments.
Leukemia	Young animals	Unknown	Swelling of lymph glands; gradual anorexia; chronic bloat; anemia; death	None

SD U5-5

INFORMATION SHEET

DISEASE OR DISORDER	SPECIES	CAUSE	SYMPTOMS	PREVENTION AND/OR TREATMENT
Hemolytic disease of Foals	Horses	Placental transmission; possible placental damage	Symptoms appear 12-36 hours following nursing; sluggish; will not nurse; anemic; accelerated pulse and respiration	Selective breeding; Milk replacer, Antibiotics; Restrained exercise for first week
Equine Infections Anemia	Horses	Viral infection; Mosquitos, parasites; stable flies, stress	Temperature 104-107°F, Muscular incoordination, Rapid dehydration, Colic, diarrhea, Anemia, Mortality 60-65%	No vaccine available; isolation; control insects; maximum sanitation; avoid congestion; minimize stress
Edema (Dropsy)	All Species Most commonly Swine	Increased capillary pressure, lowered osmotic pressure in blood; injury to capillary wall; High salt intake; High fluid intake	High temperature; Swollen eyelids; Inability to eat; Convulsions; Paralysis	Avoid abrupt feed changes and stress

ANIMAL HEALTH

UNIT V

TEST

1. Match the following terms and defintions.

______a. Shock

______b. Anaplasmosis

______c. Anemia

______d. Leukemia

______e. Edema

1. Accumulation of lymph tissue

2. A circulatory disease caused by a lack of iron

3. Circulatory deficiency, characterized by decreased blood flow

4. A circulatory disease caused by insects sometimes called gallsickness

5. A fatal malignant disease caused by extensive production of immature leucocytes and characterized by tumors of the lymph glands.

2. Name the three major parts of the circulatory system

a.

b.

c.

3. List five functions of blood

a.

b.

c.

d.

e.

4. Name five types of shock

a.

b.

TEST

c.

d.

e.

5. List four symptoms of shock

a.

b.

c.

d.

TEST

6. Complete the following chart:

DISEASE OR DISORDER	SPECIES	CAUSE	SYMPTOMS	PREVENTION AND/OR TREATMENT
Anaplasmosis				
Anemia				
Leukemia				
Edema				

SD U5-9

ANIMAL HEALTH

UNIT V

ANSWERS TO TEST

1. a. 3
   b. 4
   c. 2
   d. 5
   e. 1

2. a. Heart
   b. Vessels
   c. Blood

3. Any five of the following:
   a. Distribution of nutrients
   b. Exchange of oxygen and carbon dioxide
   c. Removal of waste
   d. Distribution of endocrine secretions
   e. Fluid distribution
   f. Regulation of body temperature
   g. Regulation of pH
   h. Defense against infection.

4. a. Traumatic
   b. Surgical
   c. Hemorrhagic
   d. Toxemia
   e. Sensitization

5. a. Lowered body temperature
   b. Tremors
   c. Pallor
   d. Rapid respiration

ANSWERS TO TEST

6.

DISEASE OR DISORDER	SPECIES	CAUSE	SYMPTOMS	PREVENTION AND/OR TREATMENT
Anaplasmosis	Cattle, Sheep	Blood sucking insects and anthropods, Mechanical transmission	Elevated temperature; Anorexia; Agalactia; Depression; Dyspnea, Anemia, Constipation, or diarrhea. Subcutaneous hematomas, Death (20-50%)	Insect control, disinfect all instruments used to penetrate skin; Isolate all sick animals; vaccination; low level feeding of tetracyclines. Treatment: Chlorotetracycline; blood transfusions, electrolytes.
Anemia	Young swine primarily. Calves, Lambs, and colts	Sow's milk deficient in iron, confinement, Failure to supplement baby pigs with iron	Fatique: Dyspnea, (Thumps); Depression; Poor growth; Edema; Rapid pulse	Addition of iron or copper to diet of suckling pigs; Soil placed in pen once a week
Leukemia	Young animals	Unknown	Swelling of lymph glands; gradual anorexia; chronic bloat; anemia; death	None
Edema (Dropsy)	All Species Most commonly Swine	Increased capillary pressure, lowered osmotic pressure in blood; injury to capillary wall; High salt intake; High fluid intake	High temperature; Swollen eyelids; Inability to eat; Convulsions; Paralysis	Avoid abrupt feed changes and stress

SD U5-11

ANIMAL HEALTH

UNIT VI

URINARY DISEASES OR DISORDERS

TERMINAL OBJECTIVE

Upon completion of this unit, the student will be able to match terms concerning the unit, name the parts of the urinary system, and discuss in writing urinary disorders.

SPECIFIC OBJECTIVES

After completion of this unit, the student will be able to:

1. Match terms and definitions concerning urinary diseases or disorders
2. Name the parts of the urinary tract
3. Complete a chart on urinary diseases or disorders
4. List three diseases or conditions of the bladder

ANIMAL HEALTH

UNIT VI

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheet
2. Provide students with Information Sheets
3. Discuss Terminal and Specific Objectives with students
4. Discuss Information Sheets
5. Give Test

Students:

1. Read Objective Sheet
2. Study Information Sheets
3. Take Test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objective Sheet
2. Information Sheets
3. Transparency Master

   TM 1 - Parts of the Urinary Tract
4. Test
5. Answers to Test

References:

1. Beef Cattle Production, Kenneth A. Wagnon, Reuben Albaugh, George H. Hart, the MacMillam Company, New York, New York.
2. Swine Production, Clarence E. Bundy, Ronald V. Diggins, Prentice-Hall, Inc., Englewood Cliffs, New Jersey.
3. The Stockman's Handbook, M.E. Ensminger, The Interstate Printers and Publishers, Inc., Danville, Illinois.

INSTRUCTIONAL MATERIALS

4. Lecture outline of Preventive Veterinary Medicine, I.A. Schipper, 5th Edition, Burgess Publishing Co., Minneapolis, Minnesota.

ANIMAL HEALTH

UNIT VI

INFORMATION SHEET

I. Terms and Definitions

   A. Nephritis - Inflammation of the kidney

   B. Pyelonephritis - (Infectious cystitis) - Inflammation of the kidney and its pelvis

   C. Urinary Calculi - bladder stones, kidney stones.

II. Parts of the Urinary System (See TM 1)

   A. Kidney - bean shaped organ

   B. Ureter - tube from kidney to bladder

   C. Bladder - elastic baloon-shaped storage organ

   D. Urethra - exit canal from bladder to exterior

INFORMATION SHEET

III. Urinary Conditions

CONDITION	SPECIES	CAUSE	SYMPTOMS	PREVENTION AND/OR TREATMENT
Nephritis	All	Infectious, navel ill; liver absesses; Overdose of toxic substances; failure to dip navel with iodine	Elevated temperature; Often little evidence or signs	Dip navels; feed proper ration
Pyelonephritis (Infectious Cystitis)	Cattle	Stress from other disease	Similar to acute colic; loss of condition; bloody urine; frequent urination	Prevent stress conditions
Urinary Calculi	Cattle, Sheep	High phosphorus; high intake of siliceous forages; high dosage DES. Castration to young; High magnesium; Sudden onset of cold; urinary tract infections	Elevated temperature; Restlessness; frequent attempts to pass urine; dribblings; water belly; Death	Prevention: Provide proper calcium to phosphorus ratio 2 to 1; avoid calculogenic grains and forages. Castrate after 12-24 weeks of age; provide salt; ammonium chloride. Treatment: Surgery, urinary tract relaxants

INFORMATION SHEET

IV. Diseases of the Bladder

- A. Displacement
  1. Invagination
  2. Tearing
  3. Vaginal prolapse
- B. Rupture
  1. Paralysis
  2. Urethral calculi
  3. Injury from coitus
  4. Tumors
- C. Cystitis
  1. Injury
  2. Secondary Infection

ANIMAL HEALTH

UNIT VI

TEST

1. Match the following terms and definitions:

______a. Nephritis	1. Inflammation of the kidney
______b. Pyelonephritis	2. Inflammation of the kidney and its pelvis
______c. Urinary Calculi	3. Bladder stones, kidney stones.

2. Name the parts of the urinary tract.

a.

b.

c.

d.

3. Complete the following chart:

Condition	Species	Cause	Symptoms	Prevention/Treatment
Nephritis				
Pyelonephritis				
Urinary Calculi				

TEST

4. List three diseases or conditions of the bladder.

   a.

   b.

   c.

ANIMAL HEALTH

UNIT VI

ANSWERS TO TEST

1. a. 1
   b. 2
   c. 3

2. a. Kidney
   b. Ureter
   c. Bladder
   d. Urethra

3. See chart on next page

4. a. Displacement
      1. Invagination
      2. Tearing
      3. Vaginal prolapse
   b. Rupture
      1. Paralysis
      2. Urethral calculi
      3. Injury from coitus
      4. Tumors
   c. Cystitis
      1. Injury
      2. Secondary Infection

ANSWERS TO TEST

3.

CONDITION	SPECIES	CAUSE	SYMPTOMS	PREVENTION/TREATMENT
Nephritis	All	Infectious, navel ill; liver absesses, Overdose of toxic substances; failure to dip navel with iodine	Elevated temperature, Often little evidence or signs	Dip navels; feed proper ration
Pyelonephritis (Infectious Cystitis)	Cattle	Stress from other disease	Similar to acute colic; loss of condition; bloody urine; frequent urination	Prevent stress conditions
Urinary Calculi	Cattle, Sheep	High phosphorus; high intake of siliceous forages; high dosage DES; high magnesium; Castration of young; Sudden onset of cold; urinary tract infections	Elevated temperature; Restlessness; frequent attempts to pass urine; dribblings, water belly; Death	Prevention: Provide proper calcium to phosphorus ratio 2 to 1; avoid calculogenic grains and forages; Castrate after 12-24 weeks of age; provide salt; ammonium chloride. Treatment: Surgery, urinary tract relaxants

ANIMAL HEALTH

UNIT VII

NERVOUS SYSTEM DISEASES AND DISORDERS

TERMINAL OBJECTIVE

Upon completion of this unit, the student will be able to name the parts of the nervous system and complete a chart on nervous system diseases and disorders. This will be evidenced by scoring eighty-five percent on the post test.

SPECIFIC OBJECTIVES

After completion of this unit, the student will be able to:

1. Match terms and definitions concerning the nervous system
2. Name the parts of the nervous system
3. Discuss in writing cerebal disorders
4. Complete a chart on nervous system diseases and disorders

ANIMAL HEALTH

UNIT VII

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheet
2. Provide students with Information Sheets
3. Discuss Terminal and Specific Objectives with students
4. Discuss Information Sheets
5. Give Test

Students:

1. Read Objective Sheet
2. Study Information Sheets
3. Take Test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objective Sheet
2. Information Sheets
3. Test
4. Answers to Test

References:

1. Beef Cattle Production, Kenneth A. Wagnon, Reuben Albaugh, George H. Hart, The MacMillam Company, New York, New York.
2. Swine Production, Clarence E. Bundy, Ronald V. Diggins. Prentice-Hall, Inc., Englewood Cliffs, New Jersey.
3. The Stockman's Handbook, M. E. Ensminger, The Interstate Printers and Publishers, Inc., Danville, Illinois.
4. Lecture outline of Preventive Veterinary Medicine, I.A. Schipper, 5th edition, Burgess Publishing Co., Minneapolis, Minnesota.

ANIMAL HEALTH

UNIT VII

INFORMATION SHEET

I. Terms and Definitions

   A. Neuron - functional unit of the nervous system

   B. Meninges - coverings for the brain and spinal cord

   C. Cranial Nerves - Specific relationship and designation

II. Anatomy of the Nervous System

   A. Neuron

   B. Central Nervous System

      1. Brain

      2. Spinal Cord

      3. Meninges

   C. Cranial Nerves

III. General Physiological and Infectious Diseases of the Nervous System

   A. Cerebal disorders

      1. Spasms

      2. Auditory disturbances

      3. Visual disturbances

   B. Causes - varies

      1. Fever

      2. Toxins - chemical

   C. Symptoms

      1. Paralysis

      2. Incoordination

      3. Paresis

INFORMATION SHEET

IV. Nervous System Diseases and Disorders

DISEASE OR DISORDER	SPECIES	CAUSE	SYMPTOMS	PREVENTION AND/OR TREATMENT
Equine Encephalomyelitis (sleeping sickness, blind staggers.)	Horses	Mosquitoes, ticks, and other blood sucking insects	Elevated temperature; Incoordination, Restlessness, Refuses food or water; Acute depression; Paralysis	Vaccination; Prevent vector contact; Force feed; Provide easy access to food and water.
Veneguelan Equine Encephalomyelitis (VEE)	Horses and to a lesser degree Sheep & Cattle	Direct contact, Rodents, birds.	Fever 103-105°. Anorexia, Depression, Diarrhea, Lips droop, Blindness, Stumbling, circling, death	Quarantine and isolate suspect animals; Vector control. Vaccination. Do not vaccinate pregnant mares.
Rabies	Horses Cattle Sheep	Viruses Usually bite, Any wound.	Restlessness, nervousness, visciousness, Rubbing, alert, Paw earth, Salivation.	Vaccination of all domestic cats and dogs; Vaccination immediately.
Aujeskye Disease (Pseudorabies mad itch)	Swine, Cattle	Skin breaks, Rats; Incidence high in garbage fed swine	Abortion, Mumified fetus, Mild respiratory signs; Anorexia, Death rare in adult swine. Salivation, Paralysis. Death in young swine.	Don't mix cattle and swine. Blood test Remove dead carcasses immediately Rat control

ANIMAL HEALTH

UNIT VII

TEST

1. Match the following terms and definitions:

______a. Neuron	1. Specific relationship and designation
______b. Meninges	2. Covering for the brain and spinal cord
______c. Cranial Nerves	3. Functional unit of the nervous system

2. Name the parts of the nervous system

   a.

   b.

      1.

      2.

      3.

   c.

3. Discuss in writing cerebal disorders.

TEST

4. Complete the following chart:

DISEASE OR DISORDER	SPECIES	CAUSE	SYMPTOMS	PREVENTION AND/OR TREATMENT
Equine Encephalomyelitis				
Veneguelan Equine Encephalomyelitis (VEE)				
Rabies				
Aujeskye Disease (Pseudorabies mad itch)				

ANIMAL HEALTH

UNIT VII

ANSWERS TO TEST

1. a. 3
   b. 2
   c. 1

2. a. Neuron
   b. Central nervous system
      1. Brain
      2. Spinal cord
      3. Meninges
   c. Cranial nerves

3. Discussion should include:
   a. Cerebal disorders
      1. Spasms
      2. Auditory disturbances
      3. Visual disturbances
   b. Causes - varies
      1. Fever
      2. Toxins - chemical
   c. Symptoms
      1. Paralysis
      2. Incoordination
      3. Paresis

ANSWERS TO TEST

4.

DISEASE OR DISORDER	SPECIES	CAUSE	SYMPTOMS	PREVENTION AND/OR TREATMENT
Equine Encephalomyelitis (sleeping sickness, blind staggers.)	Horses	Mosquitoes, ticks, and other blood sucking insects	Elevated temperature; Incoordination, Restlessness, Refuses food or water; Acute depression; Paralysis	Vaccination; Prevent vector contact; Force feed; Provide easy access to food and water.
Veneguelan Equine Encephalomyelitis (VEE)	Horses and to a lesser degree Sheep & Cattle	Direct contact, Rodents, birds.	Fever 103-105°. Anorexia, Depression, Diarrhea, Lips droop, Blindness, Stumbling, circling, death	Quarantine and isolate suspect animals; Vector control. Vaccination. Do not vaccinate pregnant mares.
Rabies	Horses Cattle Sheep	Viruses Usually bite, Any wound.	Restlessness, nervousness, visciousness, Rubbing, alert, Paw earth, Salivation.	Vaccination of all domestic cats and dogs; Vaccination immediately.
Aujeskye Disease (Pseudorabies mad itch)	Swine, Cattle	Skin breaks, Rats, Incidence high in garbage fed swine	Abortion, Mumified fetus, Mild respiratory signs; Anorexia, Death rare in adult swine. Salivation, Paralysis. Death in young swine.	Don't mix cattle and swine. Blood test Remove dead carcasses immediately Rat control

ANIMAL HEALTH

UNIT VIII

SKIN AND EYE DISEASES

TERMINAL OBJECTIVE

Upon completion of this unit, the student will be able to list the functions of skin and complete a chart on skin and eye diseases. This will be evidenced by scoring eighty-five percent on the post test.

SPECIFIC OBJECTIVES

After completion of this unit, the student will be able to:

1. Match terms and definitions concerning skin and eye diseases
2. Name the four parts of the anatomy of skin
3. List five functions of skin
4. Complete a chart on skin and eye diseases

ANIMAL HEALTH

UNIT VIII

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheet
2. Provide students with Information Sheets
3. Discuss Terminal and Specific Objectives with students
4. Discuss Information Sheets
5. Give Test

Students:

1. Read Objective Sheet
2. Study Information Sheets
3. Take Test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objective Sheet
2. Information Sheets
3. Test
4. Answers to Test

References:

1. Beef Cattle Production, Kenneth A. Wagnon, Reuben Albaugh, George H. Hart, The MacMillam Company, New York, New York.
2. Swine Production, Clarence E. Bundy, Ronald V. Diggins, Prentice-Hall, Inc., Englewood Cliffs, New Jersey.
3. The Stockman's Handbook, M. E. Ensminger, The Interstate Printers and Publishers, Inc., Danville, Illinois.
4. Lecture outline of Preventive Veterinary Medicine, I.A. Schipper, 5th edition, Ed. Burgess Publishing Co., Minneapolis, Minnesota.

ANIMAL HEALTH

UNIT VIII

INFORMATION SHEET

I. Terms and Definitions

   A. Parakeratosis - A chronic skin condition of hogs appearing in its early life stages to resemble mange.

   B. Cancer Eye - A small tumor on the eyelid or eyeball; irritation around the eye

   C. Pink eye - Watering and squinting of eyelid; severe reddening of the membrane.

II. Anatomy

   A. Epidermis

   B. Dermis

   C. Sebaceous glands

   D. Sweat glands

III. Functions of Skin

   A. Mechanical protection

   B. Protection against noxious gases

   C. Protection against light

   D. Regulate body temperature

   E. Organ of secretion

   F. Formation of Vitamin D

   G. Sensory structure

   H. Organ of respiration

   I. Protection against radioactive materials

INFORMATION SHEET

IV. Skin Diseases

DISEASE OR DISORDER	SPECIES	CAUSE	SYMPTOMS	PREVENTION AND/OR TREATMENT
Cowpox	Cattle	Introduced by infected animals; milking machines	Decreased milk production, Mastitis, Ruptures and scab formation	Sanitation; Immunization not practical
Swine pox	Swine	Lesions	Fungus-like infection	Good management; External parasite control.
Ringworm	Cattle, Horses, Swine	Contact with infected animals.	Loss of hair; dry, crusty, scaly, grayish to yellowish powdery appearance	Sanitation; Apply tincture of iodine
Warts	Cattle, Horses	Viruses	Formation of dry, horny, cauliflower-like growths about the head and neck	Vaccination; Surgical removal
Parakeratosis	Swine	Zinc deficiencies	Necrotic tails shortly after farrowing. Diarrhea, Depression, Loss of weight	Addition of zinc to diet. Change ration. Put on pasture if available
Photosensitization (Sunburn)	Cattle, Sheep, Swine	Sunlight	Excessive salivation, Redness of skin; licking; White skin primarily udder; teats, ears, tail	Remove animal from sunlight. Systemmatic medication.

INFORMATION SHEET

DISEASE OR DISORDER	SPECIES	CAUSE	SYMPTOMS	PREVENTION AND/OR TREATMENT
Exudative Epidermitis (Greasy pig disease)	Swine	Virus Bacterial Contamination	Similar to parakeratosis; pigs 12-24 days old, Depression, dehydration, excessive skin secretions, characteristic odor.	Bathing
Cancer eye	Cattle	Irritation; Skin pigmentation	A small tumor on eyelid or eyeball; irritation around eye	Early diagnosis followed by surgery; slaughter.
Pink eye	Cattle & Sheep	Irritation; Skin pigmentation	Watering and squinting of eyelid; severe reddening of membrane	Isolate affected animals; use antibiotics for control.

ANIMAL HEALTH

UNIT VIII

TEST

1. Match the following terms and definitions.

______a. Parakeratosis

______b. Cancer eye

______c. Pink eye

1. A small tumor on the eyelid or eyeball, irritation around the eye
2. Watering and squinting of the eyelid; severe reddening of the membrane.
3. A chronic skin condition of hogs appearing in its early life stages to resemble mange.

2. Name the four parts of the anatomy of the skin

a.

b.

c.

d.

3. Name five functions of skin.

a.

b.

c.

d.

e.

TEST

4. Complete the following chart on skin and eye diseases.

DISEASE OR DISORDER	SPECIES	CAUSE	SYMPTOMS	PREVENTION/TREATMENT
Parakeratosis				
Photosensitization				
Greasy pig disease				
Ringworm				
Warts				
Pinkeye				
Cancer eye				

ANIMAL HEALTH

UNIT VIII

ANSWERS TO TEST

1. a. 3
   b. 1
   c. 2

2. a. Epidermis
   b. Dermis
   c. Sebaceous Glands
   d. Sweat glands

3. Any five of the following:
   a. Mechanical protection
   b. Protection against noxious gases
   c. Protection against light
   d. Regulate body temperature
   e. Organ of secretion
   f. Formation of Vitamin D
   g. Sensory structure
   h. Organ of respiration
   i. Protection against radioactive materials

ANSWERS TO TEST

4.

DISEASE OR DISORDER	SPECIES	CAUSE	SYMPTOMS	PREVENTION AND/OR TREATMENT
Parakeratosis	Swine	Zinc deficiencies	Necrotic tails shortly after farrowing. Diarrhea, Depression, Loss of weight	Addition of zinc to diet. Change ration. Put on pasture if available
Photosensitization (Sunburn)	Cattle, Sheep, Swine	Sunlight	Excessive salivation, Redness of skin; licking; White skin primarily udder; teats, ears, tail	Remove animal from sunlight. Systemmatic medication.
Exudative Epidermitis (Greasy pig disease)	Swine	Virus Bacterial Contamination	Similar to parakeratosis; pigs 12-24 days old, Depression, dehydration, excessive skin secretions, characteristic odor.	Bathing
Ringworm	Cattle, Horses, Swine	Contact with infected animals.	Loss of hair; dry, crusty, scaly, grayish to yellowish powdery appearance	Sanitation; Apply tincture of iodine
Warts	Cattle, Horses	Viruses	Formation of dry, horny, cauliflower-like growths about the head and neck	Vaccination; Surgical removal

ANSWERS TO TEST

DISEASE OR DISORDER	SPECIES	CAUSE	SYMPTOMS	PREVENTION AND/OR TREATMENT
Cancer eye	Cattle	Irritation; Skin pigmentation	A small tumor on eyelid or eyeball; irritation around eye	Early diagnosis followed by surgery; slaughter.
Pink eye	Cattle & Sheep	Irritation; Skin pigmentation	Watering and squinting of eyelid; severe reddening of membrane	Isolate affected animals; use antibiotics for control.

ANIMAL HEALTH

UNIT IX

ACUTE GENERALIZED INFECTIOUS DISEASES

TERMINAL OBJECTIVE

Upon completion of this unit, the student will be able to complete a chart discussing the species, causes, symptoms, and prevention or treatment of acute generalized infectious diseases. This will be evidenced by scoring eighty-five percent on the post test.

SPECIFIC OBJECTIVES

After completion of this unit, the student will be able to:

1. Complete a chart on species affected, causes, symptoms, and prevention or treatment of acute generalized infectious diseases.

ANIMAL HEALTH

UNIT IX

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheet
2. Provide students with Information Sheets
3. Discuss Terminal and Specific Objectives with students
4. Discuss Information Sheets
5. Give Test

Students:

1. Read Objective Sheet
2. Study Information Sheets
3. Take Test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objective Sheet
2. Information Sheets
3. Test
4. Answers to Test

References:

1. Beef Cattle Production, Kenneth A. Wagnon, Reuben Albaugh, George H. Hart, The MacMillam Company, New York, New York.
2. Swine Production, Clarence E. Bundy, Ronald V. Diggins, Prentice-Hall, Inc., Englewood Cliffs, New Jersey.
3. The Stockman's Handbook, M. E. Ensminger, The Interstate Printers and Publishers Inc., Danville, Illinois.
4. Lecture outline of Preventive Veterinary Medicine, I.A. Schipper, 5th Edition, Burgess Publishing Co., Minneapolis, Minnesota.

ANIMAL HEALTH

UNIT IX

INFORMATION SHEET

I. Acute Generalized Infectious Diseases.

DISEASE OR DISORDER	SPECIES	CAUSE	SYMPTOMS	PREVENTION AND/OR TREATMENT
Anthrax	All species	Consumption of contaminated feed, skin breaks or wounds, Improperly processed feeds, Climatic conditions	Elevated temperature; Excitement; Dyspnea; Death in 10-24 hours.	Immunization Sanitation
Tetanus (lockjaw)	Horses, Sheep, Swine, Cattle, Young animals most susceptible.	Prevelant in horse manure; Strictly anerobic; castration, docking, mouth wounds, parturition, shearing, ear tags, dehorning.	Depression, Difficult mastication; Stiffness; Death.	Avoid sharp objects; Employ strict asepsies when on any surgical procedures. Treatment: Quiet clean quarters, Vaccination.
Blackleg	Cattle & Sheep	Bacteria; Contaminated premises.	Lameness, Swelling at site of wounds; Elevated temperature; usually young animals.	Immunization; Sanitation.

INFORMATION SHEET

DISEASE OR DISORDER	SPECIES	CAUSE	SYMPTOMS	PREVENTION AND/OR TREATMENT
Erysipelas	Swine Lambs Calves	Contaminated yards; Infected wild rats, mice, birds; contaminated feed and water	Signs of chilling; rapid death; depression; skin lesions, diarrhea; joint enlargement.	Sanitation; Good Management; Isolate new animals 30 days; Proper disposal of dead animals; Immunization. Treatment: Antibiotics
Pododermatitis (Footrot)	Cattle	Injury to foot; Filthy yards or pens; Break in skin; Bacteria.	Lameness; Elevated temperature; Swollen foot and leg; Anorexia; Emaciation, Characteristic odor from infected area.	Sanitation; Adequate or high Vitamin A.
Foot and Mouth Disease	Cattle Sheep Swine Horse	Contact with infected hosts; Insects; Uncooked garbage	Elevated temperature; Anorexia, Salivation; Depression; Emaciation, High morbidity; Low mortality.	Vaccination; Quarantine of suspect animals and area; Slaughter of all infected and exposed animals in quarantine area.

ANIMAL HEALTH

UNIT IX

TEST

Complete the following chart.

DISEASE OR DISORDER	SPECIES	CAUSE	SYMPTOMS	PREVENTION AND/OR TREATMENT
Anthrax				
Tetanus (lockjaw)				
Blackleg				
Erysipelas				
Pododermatitis (Footrot)				
Foot and Mouth Disease				

ANIMAL HEALTH

UNIT IX

ANSWERS TO TEST

DISEASE OR DISORDER	SPECIES	CAUSE	SYMPTOMS	PREVENTION AND/OR TREATMENT
Anthrax	All species	Consumption of contaminated feed, skin breaks or wounds, Improperly processed feeds, Climatic conditions	Elevated temperature; Excitement; Dyspnea; Death in 10-24 hours.	Immunization Sanitation
Tetanus (lockjaw)	Horses, Sheep, Swine, Cattle, Young animals most susceptible.	Prevelant in horse manure; Strictly anerobic; castration, docking, mouth wounds, parturition, shearing, ear tags, dehorning.	Depression, Difficult mastication; Stiffness; Death.	Avoid sharp objects; Employ strict asepsies when on any surgical procedures. Treatment: Quiet clean quarters, Vaccination.
Blackleg	Cattle & Sheep	Bacteria; Contaminated premises.	Lameness, Swelling at site of wounds; Elevated temperature; usually young animals.	Immunization; Sanitation.
Erysipelas	Swine Lambs Calves	Contaminated yards Infected wild rats, mice, birds; contaminated feed and water	Signs of chilling; rapid death; depression; skin lesions, diarrhea; joint enlargement.	Sanitation; Good Management; Isolate new animals 30 days; Proper disposal of dead animals Immunization. Treatment: Antibiotics

ANSWERS TO TEST

DISEASE OR DISORDER	SPECIES	CAUSE	SYMPTOMS	PREVENTION AND/OR TREATMENT
Pododermatitis (Footrot)	Cattle	Injury to foot; Filthy yards or pens; Break in skin; Bacteria.	Lameness; Elevated temperature; Swollen foot and leg; Anorexia; Emaciation, Characteristic odor from infected area.	Sanitation; Adequate or high Vitamin A.
Foot and Mouth Disease	Cattle Sheep Swine Horse	Contact with infected hosts; Insects; Uncooked garbage	Elevated temperature; Anorexia, Salivation; Depression; Emaciation, High morbidity; Low mortality.	Vaccination; Quarantine of suspect animals and area; Slaughter of all infected and exposed animals in quarantine area.

ANIMAL HEALTH

UNIT X

PARASITOLOGY

TERMINAL OBJECTIVE

Upon completion of this unit, the student will be able to match terms concerning parasites, their prevention, and their control. He(she) should also be able to discuss insecticide toxicity as to its etiology, influencing factors, symptoms and prevention. He(she) should also be able to discuss common insecticides used. This will be evidenced by scoring eighty-five percent on the post test.

SPECIFIC OBJECTIVES

After completion of this unit, the student will be able to:

1. Match terms concerning parasitology
2. Discuss in writing the pathogenicity of parasites
3. Discuss in writing the prevention of parasites
4. Discuss in writing insecticide toxicity as to cause, influencing factors, symptoms, and prevention
5. Discuss in writing three common anthelmintics as to characteristics, toxicity, contraindication and indications.
6. List external parasites as to host, symptoms, and life cycle
7. List internal parasites as to host, symptoms, and life cycle

ANIMAL HEALTH

UNIT X

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheet
2. Provide students with Information Sheets
3. Discuss Terminal and Specific Objectives with students
4. Discuss Information Sheets
5. Give Test

Students:

1. Read Objective Sheet
2. Study Information Sheets
3. Take Test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objective Sheet
2. Information Sheets
3. Test
4. Answers to Test

References:

1. Beef Cattle Production, Kenneth A. Wagnon, Reuben Albaugh, George H. Hart, The MacMillam Company, New York, New York.
2. Swine Production, Clarence E. Bundy, Ronald V. Diggins, Prentice-Hall Inc., Englewood Cliffs, New Jersey.
3. The Stockman's Handbook, M.E. Ensminger, The Interstate Printers and Publishers, Inc., Danville, Illinois.
4. OSU Extension Facts "Beef Cattle Parasite Control", Sidney E. Kung, Oklahoma State University, Stillwater, Oklahoma.

INSTRUCTIONAL MATERIALS

5. Lecture outline of Preventive Veterinary Medicine, I.A. Schipper, 5th Edition, Burgess Publishing Company, Minneapolis, Minnesota.

ANIMAL HEALTH

UNIT X

INFORMATION SHEET

I. Terms and Definitions

    A. Parasitology - A science dealing with organisms that live on or in other organisms called hosts

    B. Parasitism - When one organism suffers (host) and one benefits

    C. Obligatory parasitism - Entire life cycle is parasitic

    D. Facultative parasitism - may become parasitic

    E. Permanent parasitusm - Always live as parasites

    F. Periodic parasitism - Lives off host for short periods

    G. Temporary parasitism - Live free or away from host part of life cycle.

    H. Erratic parasitism - Occurring in organ that is not normal habitat

    I. Incidental parasitism - Occurring in other than normal host

    J. Ectoparasite (external) - Lives on exterior of the host

    K. Endoparasite (internal) - Lives within body of host

    L. Definative host - Host harboring sexually mature parasite

    M. Intermediate host - Host harboring larva or sexually producing organism

II. Pathogenicity

    A. Effects of parasite depend on

        1. Number of parasites - degree of symptomatology

        2. Habits

            a. Migration

            b. Life cycle

            c. Carrier form

INFORMATION SHEET

3. Degree of adaptation
4. Condition of host
    a. Stress
    b. Nutrition
    c. Prevention program

B. Pathology produced by
    1. Absorption of food intended for host - (tapeworm)
    2. Sucking of blood - anemia - (ticks, lice)
    3. Tissue damage - (ascarids, lung worms)
    4. Mechanical obstruction - (ascarids)
    5. Toxin production - (ascarids)
    6. Transmission of infectious agents - (swine flu)

C. Site of Infection
    1. Digestive tract
    2. Liver
    3. Lungs
    4. Kidneys
    5. Skin

III. Prevention of Parasites

A. Control
    1. Prevention of consumption of eggs or larva (good management)
        a. Pasture rotation - avoid following ruminants with ruminants
        b. General sanitation - frequent manure removal
        c. Provide clean feed and water - avoid fecal and urine contamination

INFORMATION SHEET

- d. Drainage of low wet areas in pasture and paddocks
- e. Keep young animals away from older (carrier) animals or pastures where older animals have grazed
- f. "Break" life cycle of parasite
- g. Use of chemotherapeutic agents
    - 1. Dips
    - 2. Sprays
    - 3. Anthelmintics

B. Prophylactic chemotherapy

- 1. Medication based on knowledge of
    - a. Types of parasites present within host
        - 1. Laboratory examination of feces of animals suspected of parasitism
        - 2. Postmortem examination of one or more animals suspected of parasitism
    - b. Physiological action of drugs to be utilized
        - 1. Purpose of drug
            - a. Relieve animal of acute parasitism
            - b. Prevent occurrence of acute parasitism
        - 2. Most drugs utilized in parasite control have varying degrees of toxicity
    - c. Evaluation of condition of animals to be treated
        - 1. Elimination of possible infectious or nutritional condition with similar symptomatology
        - 2. Extreme unthriftiness due to parasitism may result in death following treatment
    - d. Skill in administering drugs
        - 1. Proper therapeutic dosage

INFORMATION SHEET

2. Proper route and method of administration
3. Knowledge of possible toxic results

IV. Insecticide Toxicity

A. Etiology

1. Consumption of forage treated with insecticide
2. Absorption of insecticides applied directly to skin

B. Influencing factors

1. Direct application to animal
    a. Recommendations vary with development of new products
    b. Following directions on container
    c. Danger often from misuse
2. Emulsions may increase quantity deposit and toxicity
3. Wet table or suspensible powders
    a. Settle and pack
    b. Excessive amounts at end of spraying
4. Susceptibility
    a. Younger animal most susceptible
    b. Dairy breeds more susceptible than beef - body surface to body weight
    c. Poor physical condition - more susceptible

C. Symptoms

1. First more alert
2. Muscular tremors (shivering)
    a. Stimulated by sharp noise
    b. Begin anteriorly and progress posteriorly

INFORMATION SHEET

3. Recumbency - paddling movements

4. Salivation

5. Death

6. Symptoms appear within 48 hours of exposure

7. Symptoms vary

    a. Concentration of preparation

    b. Type of preparation

8. At first signs of symptoms suggestive of insecticide or herbicide poisoning contact a veterinarian

D. Prevention

Follow instructions on labels of containers

V. Common Anthelmintics

A. Phenothiazine

1. Characteristics

    a. Low solubility in water

    b. Excreted in feces and urine

    c. Purified forms most effective

    d. Relatively ineffective on immature helminths

    e. Smaller particles provide greatest effectiveness

2. Toxicity

    a. Variable with species, individuals, and environment

    b. Birds and sheep most resistant

    c. Horses most susceptible

3. Contraindications

    a. Weak

    b. Anemia

    c. Late pregnancy

INFORMATION SHEET

4. Photosensitization
5. Indications
    a. Cattle
        1. Stomach worms - Haemonchus sp., Ostertagia sp.
        2. Nodular worm - Oesophagastomum sp., Trichostrongylus sp.
        3. Hookworm - Bunostomum sp.
    b. Sheep
        1. Stomach worms - Haemonchus sp., Ostertagia sp., Trichostrongylus sp.
        2. Nodular worms - Oesophagostomum sp.
        3. Hookworms - Bunostomum sp.
        4. Cooperids - Cooperia sp.
        5. Nematodirus sp.
    c. Poultry
        1. Cecal worms - Heterakis sp.
        2. Ascarids - Ascaridia sp.

B. Piperazine
    1. Characteristics
        a. Urine excretion: 30-40%
        b. Orally - grain, bolus, drench
        c. Deprive of feed or water 22 hours previous to voluntary medication
        d. Mature parasites most susceptible
    2. Toxicity
        a. Relatively nontoxic
        b. Spasmogenic effect on intestine - large doses

INFORMATION SHEET

3. Indications
    a. Cattle
        1. Nodular worms - Oesophagostomum sp.
    b. Sheep
        1. Nodular worms - Oesophagostomum sp.
    c. Swine
        1. Ascarids - Ascaris sp.
        2. Nodular worms - Oesophagostomum sp.
    d. Horse
        1. Ascarids - Parascaris sp.
        2. Strongyles - Trichonema sp.
            a. Triodantophorus sp.
            b. Strongylus sp.
        3. Pinworms - Oxyuris sp.
    e. Poultry
        1. Ascarids - Ascaridia sp.
        2. Cecal worm - Heterakis sp.

C. Hygromycin B
    1. Characteristics
        a. Antibiotic - Streptomyces hygroscopicus
        b. Continuous feeding most effective
    2. Toxicity
        a. May impair hearing
        b. Can be fed to pregnant sows

INFORMATION SHEET

3. Indications
    a. Swine
        1. Large roundworm - Ascaris sp.
        2. Nodular worm - Oesophagostomum sp.
        3. Whipworm - Trichuris sp.

D. Thiabendazole
    1. Characteristics
        a. Broad spectrum activity
        b. Active against immature and mature worms
        c. Feed need not be withheld to stimulate consumption
        d. Inhibits egg production
    2. Toxicity
        a. Wide margin of safety - twenty times overdose produced no problems in cattle
    3. Indications
        a. Ruminants
            1. Stomach worms - Haemonchus sp.
               Ostertagia sp.
               Trichostrongylus sp.
            2. Nodular worms - Oesophagostomum sp.
            3. Cooperids - Cooperia sp. Nematodirus sp.
            4. Hookworm - Bunostomum sp.
            5. Intestinal threadworm - Strongyloides sp. Capillaria sp.
            6. Large mouth bowel worm - Chabertiva ovina
            7. Whipworm - Trichuris sp.

INFORMATION SHEET

b. Horse

1. Strongyles - bloodworm - Strongylus sp.
2. Pinworms
3. Ascarids

c. Swine

1. Large roundworms - Ascaris sp.
2. Kidney worm - Macrocathorhincus sp.
3. Trichina - Trichinella sp.

E. Tetramisole (Levamisole) Tramisol^{R}

1. Characteristics

   a. Broad spectrum

      1. Particularly effective on Coopera sp.
      2. Controls mature and immature worms
      3. Administered orally, drench or bolus

2. Toxicity

   a. Wide margin of safety

3. Indications

   a. Stomach worms - Haemonchus sp.
Trichostrongylus sp.
Ostertagia sp.

   b. Intestinal worms - Trichostrongylus sp.
Cooperia sp.
Nematodirus sp.
Bunostomum sp.
Oesophagostomum sp.

   c. Lung worms - Dictyocaulus sp.

INFORMATION SHEET

F. Dichlorvos (Atgard) ^{R} (Equigard) ^{R}

1. Characteristics
    - a. Anthelmintic for horses or swine
    - b. Provided in resin pellets - sustained release
    - c. Palatable
    - d. Volatile - following opening of sealed package - should not be stored
    - e. Effective on mature and fourth stage larvae
    - f. Broad spectrum
2. Toxicity
    - a. Minimum in swine if instructions are followed
    - b. Wide margin of safety in horses
3. Indications
    - a. Swine
        1. Roundworms - Ascaris lumbricoides var. suis
        2. Nodular worms - Oesophagostomum sp.
        3. Whipworms - Trichuris suis
    - b. Horses
        1. Bots - Gasterophilus sp.
        2. Strongyles - Strongylus sp.
        3. Pinworms - Oxyuris equi sp.
        4. Roundworms - Para ascaris equi sp.

G. Grubicides
(Coumaphas (co-Ral)^R, Triclorofon (Neguvon)^R, Ruelene)

1. Characteristics
    - a. Apply immediately after first killing frost

INFORMATION SHEET

2. Toxicity

    a. Sheep generally more susceptible to toxic reactions than cattle

3. Indications

    a. Grub control - Hypoderma sp.

    b. Some gastrointestinal parasites - Haemonchus sp.

        Trichostrongylus sp.

        Cooperis sp.

    c. Like (Co-Ral)

INFORMATION SHEET

VI. External Parasites

PARASITE	HOST	SYMPTOMATOLOGY	LIFE CYCLE
(Acariasis) Ixodidae sp. (Hard Ticks) Lone Star tick (Southern U.S.)	All domestic and wild animals Man	Irritation Decreased production Skin abscesses Anemia Screw worm infection Disease vectors	Mate on host - females feed - fall to ground - deposit eggs on debris - hatch in about 2 weeks. Seed ticks crawl on plants - attach on passing animal - feed - drop to ground - repeat process until they become adults.
Gulf Coast tick (Southern U.S.)	All domestic and wild animals (Inside ear of cattle) Ground nesting birds *		
Rocky Mountain tick (Northwestern U.S)	Domestic and wild animals Man *Rodents		
American Dog tick (All U.S.)	Dog - other domestic & wild animals Man *Rodents		
Ticks Boophilus sp. (Cattle Tick Fever) (Eradicated from U.S)	Cattle	Blood loss Emaciation Disease spread (Cattle Tick Fever) Elevated temperature Jaundice Emaciation	Lay eggs in sheltered areas (soil, crack in wood, under rocks). Female dies after eggs are laid. Larva crawl on grass or brush to attach themselves to host. The larva goes into nymph stage. Engorges on blood and moults. Breeds.

*Intermediate host

INFORMATION SHEET

PARASITE	HOST	SYMPTOMATOLOGY	LIFE CYCLE
Argasidae sp. (Soft ticks) Fowl tick	Domestic poultry	Anemia Death Disease vector	Female engorges with blood - drops to ground - remains in debris - lays eggs. Seed tick attaches to host - feeds on blood - matures
Spinose eartick	Domestic or wild animals (inside of ear)	Irritation Annoyance	Larvae crawl into outer ear - remain for 1-7 months - drop to ground - crawl into buildings, fences, feedbunks, trees, mature - mate - deposit eggs.
Metophages ovinus (Sheep tick) Sheep ked)	Sheep	Skin irritation Wool loss Unthrifty	Female attaches to wool - parturates - pupation. Engorged females may live off host for at least 1 week. Cycle may be completed within 40 days.
Mange Sarcoptes scabiei (Sarcoptic)	Horse (head, neck, shoulders) Sheep - seldom Swine (head to entire body)	Skin irritation and inflammation Exudate Rubbing Red papules or vesicles Wool or hair loss Scabs	Burrow in skin - lay egg in tunnel - larvae remain in tunnel or burrow into new areas. Become mature in about 17 days. Can live only few days off host. Spread by contact.
Psoroptic equi (Psoroptic) (Sheep scab) Chorioptes sp. (Chorioptic, Leg mange of horse)	Horse (sheltered parts of body - long hair) Cattle - seldom Sheep (thick wool areas) Horse (lower parts of hind legs) Cattle (tail region - all parts of body) Sheep (legs and scrotum)		Egg laid at edge of skin lesions. Hatch 1-5 days- become nymphs - mature - breeding begins. Mites feed on lymph.

INFORMATION SHEET

PARASITE	HOST	SYMPTOMATOLOGY	LIFE CYCLE
Demodex sp.	Cattle - seldom (Neck and shoulders) Sheep		Live in hair follicles and sebaceous glands - life cycle completed on skin
Pediculosis		Weight loss Lowered vitality Mangy appearance Constant rubbing Hair loss Skin irritation Anemia	Eggs laid on hairs and feathers. Hatch 5-8 days. Moult 3-5 times. Become adults 2-3 weeks. Cannot live off host more than several days. Spread by contact.
Damalinia sp (Biting louse)	Horse		
Anoplura sp. (Short-nosed louse)	Cattle		
	Sheep		
Linognathus (Long-nosed louse)	Swine		
Haematopinus sp.			
Menacathus sp.	Chicken (Skin)		
Menopon sp.	Feathershaft		
(plus five other species)			
Dermanyssus gallinae (Red or roost mite)	Poultry (Attacks at night)	Sucks blood Anemia Spread of disease Lowered egg production	Lay eggs after first blood meal - hatch - six-legged larvae - bloodsucking nymphs - adults. Entire life cycle within seven days.
Bdellonyssus sp. (Northern feather mite)	Poultry (on birds and their surroundings continuously)		
Cnemidocoptes sp.	Poultry	Lesions on unfeathered portions of legs. Sometimes on comb and wattles. Similar to sarcoptic mange of animals. Lameness - scales and crusts on leg.	Unknown

INFORMATION SHEET

PARASITE	HOST	SYMPTOMATOLOGY	LIFE CYCLE
Hypoderma sp. (Cattle grub, Heel fly, Bomb fly)	Cattle	Irritation Running Fail to graze Raised areas under skin on back Lowered milk production Lowered hide value Toxic conditions	Flies lay eggs on hair of legs & abdomen. Hatch in 3-5 days - migrate through skin - migrate toward diaphragm and esophagus where they remain until late winter then migrate to subcutaneous tissue of back. Mature larva leaves cyst and falls to ground - pupates - mature fly emerges in approx. 1 month.
Stomoxys calcitrans	All animals	Irritation Lowered milk production Spread of disease (Blood suckers)	Lay eggs in moist manure or vegetable matter - hatch in 1-4 days. Larvae mature 2-3 weeks - complete cycle in 30 days.
Haematobia irritanus (Horn fly)	Cattle - mainly	Similar to S. calcitrans	Winter as larvae in fecal material-lay eggs in fresh droppings. Eggs hatch - pupate - rebreed in 10-12 days.

INFORMATION SHEET

VII. Internal Parasites

PARASITE	HOST	SYMPTOMATOLOGY	LIFE CYCLE
Stomach Worms Haemonchus sp. (Large stomach worm wire worm	Cattle (abomasum)	Digestive disturbances; young animals primarily-watery-profuse diarrhea Anemia "Bottle-Jaw" Weight loss	Direct; eggs passed in feces-hatch shortly unless unfavorable conditions-may remain dormant for extended periods
Ostertagia sp. (Medium, brown stomach worm)	Sheep (abomasum)	Haemonchus-sheep Death before eggs are passed More susceptible than cattle	Ostertagia most resistant particularly to cold
Trichostrongylus sp. (Small stomach worm, bankrupt worm)	Horse		
Hyostrongylus sp. (Red stomach worm) (Thin stomach worm)	Swine	Few lesions High infestation Weight loss	Direct
Ascarops sp. (Thick stomach worm) Physocephalus sp. (Thick stomach worms)	Swine *Coprophagous beetles		Eggs swallowed by beetles-hatch in beetle. Pigs become infected by consuming beetles.

*Intermediate Host

INFORMATION SHEET

PARASITE	HOST	SYMPTOMATOLOGY	LIFE CYCLE
Habronema sp. (Horse stomach worm)	Horse Mule Ass Donkey *House or stable fly	Gastric irritation, Colic	House or stable fly larvae ingest eggs-which mature and infect house flies-fly ingested by horse-develop into adult parasites-live in stomach-lay eggs in digestive system which are passed in feces
Cooperia (coperids) 3 species	Cattle (upper small intestine)	Profuse diarrhea, emaciation, anorexia No anemia	Same as Haemonchus
Bunostomum sp. (Hookworm)	Cattle (Anterior-small intestine)	Death in young calves Skin scabs-site of larval penetration Anemia Weight loss Edema Blood suckers	Same as Haemonchus, except infection may occur by skin penetration as well as ingestion.
Strongyloides sp. (Intestinal thread-worm)	Cattle (Anterior-small intestine) Sheep Swine (Burrow into wall of sm. intestine	Signs rare-may cause death Edema, skin inflammation Heavy infection diarrhea, anemia Emaciation Death possible Skin damage between claws	Direct Only females occur in parasitic stage. Eggs passed in feces-hatch-develop directly into larvae or free-living adults. Infection is by ingestion or skin penetration.
Nematodirus sp.	Cattle Sheep (Small intestine)	Diarrhea Anorexia Weakness Dehydration	Direct Larvae mature in intestine-approximately 30 days

*Intermediate Host

INFORMATION SHEET

PARASITE	HOST	SYMPTOMATOLOGY	LIFE CYCLE
Ascaris lumbricoides (Large roundworm) (Ascarid)	Swine (Small intestine)	Reduced growth Mechanical obstruction of intestine Occlude bile duct Mechanical damage during larvae migration in liver and lungs "Thumps"-respiratory signs Unthrifty	Female produces 250,000 eggs per day, infective in 2-3 weeks; ingested eggs hatch-larvae hatch in intestine-penetrate wall-enter portal circulation. Grow in liver, then carried to lungs through blood vessels-passed to digestive tract through bronchial tree.
Oesophagostomum sp. (Nodular worm)	Cattle (Intestinal mucosa) Sheep Swine (Large intestine)	Heavy infection, anorexia, emaciation, diarrhea Predispose intususception; Mucus and blood in feces Nodule formation most pronounced in sheep	Direct Similar to Haemonchus
Chabertia ovina (Large-mouth bowel worm)	Cattle (Colon) Sheep	Edema Mucus and blood in feces Diarrhea	Direct Similar to Stongylus sp.
Ascaridia galli (Large roundworm)	Poultry (Intestine)	Droopiness, emaciation Diarrhea	Direct cycle Orally through droppings
Heterakis gallinae (Cecal worm)	Poultry	Weakness, unthrifty Carrier of blackhead through its eggs	Direct Similar to roundworm
Capillaria sp. (Capillary worms) (Roundworms)	Poultry (Crop, small intestine, cecal) *Earthworm for some species	Emaciation Weakness Droopiness	Direct for most species Earthworm intermediate host Host for some species

*Intermediate Host

INFORMATION SHEET

PARASITE	HOST	SYMPTOMATOLOGY	LIFE CYCLE
Strongylus sp. (Horse nematode) (Palisade worms) (Strongylosis) (Bloodworms) (Redworms)	Horse Mule Ass	Varying symptoms of unthriftiness-emaciation, anemia and decreased vitality-diarrhea	Large ingested-mature-migrate in mesenteric artery, liver, lungs and return to digestive tract where eggs are laid-pass in feces- hatch in feces and soil-become infective.
Parascaris equorum (Horse roundworm)	Horse Mule Ass	Liver injury, bowel obstruction; possible perforation Obstruction of bile duct Respiratory and digestive disturbance	Eggs ingested-larvae migrate to lungs via bloodstream-mature-return to digestive tract via trachea-lay eggs which are passed in feces-develop to infective stage in feces and soil.
Taenia sp. (Tapeworm cysts) T. solium	Man *Pig, dog	Diagnosis usually based on post mortem examination	Eggs ingested by pig-hatch in intestine-penetrate intestinal wall and migrate throughout body. Man infected by eating raw or poorly cooked pork.
T. saginata	Man *Cattle (Cysticercus bovis)		Similar to T. solium except cattle act as intermediate host.
T. hydatigena	Canines *Cattle *Sheep *Swine		Similar to T. saginata

*Intermediate Host

INFORMATION SHEET

PARASITE	HOST	SYMPTOMATOLOGY	LIFE CYCLE
Tapeworms (Taenoid cestodes) 11 species	Poultry (Small intestine) *Insects, small *Earthworm	Unthrifty Weak Diarrhea possible	Eggs ingested by intermediate host-incubate approximately 3 weeks. Invested intermediary host consumed by bird. Cysticercoid freed by digestive enzymes and attaches to intestinal wall.
Moniezia sp. (Tapeworms)	Cattle Sheep *Grass Mite	Emaciation-Rough Coat Pot-bellied Edema Anemia May predispose enterotoxemia	Eggs consumed by grass mites-larva development in mite-mite consumed by host. Larvae liberated in GI tract of host.
Trichinella spiralis	Man Pig Rat Bear	Man: Vomiting Abdominal pain Muscular pain Fever Edema Pneumonia Death	Adult worms copulate in intestine-males die-females penetrate lymph spaces-lay eggs which hatch and larvae are distributed to voluntary muscles via blood and lymph channels. Man becomes infected by eating uncooked pork. Swine infected by infected rats.
Macracanthorhychus hirudinaceus (Thorny-headed worm)	Swine (Small intestine) *May beetle (*Dung beetle) (*June Bug)	Emaciation Peritonitis Death	Eggs passed in feces. Ingested by white grub. Larvae-worm encysts in beetle. Swine infected upon ingestion of beetle. Hatch in small intestine.

*Intermediate Host

INFORMATION SHEET

PARASITE	HOST	SYMPTOMATOLOGY	LIFE CYCLE
Lung worms (Husk) Dictyocaulus sp. (Verminaus bronchitis) (Hoose)	Cattle Sheep Horse	Coughing Mucus from nostrils Dyspnea Emaciation Anemia Pneumonia	Eggs-coughed up-swallowed-hatch in intestine-passed in feces in larva stage-ingested by host-penetrate intestinal wall-migrate to lungs.
Lung worms Metastrongylus sp.	Swine *Earthworm		Eggs passed in feces-ingested by earthworm as eggs or larvae-pig infected by ingestion of earthworms-larvae penetrate intestinal wall-migrate to lungs.
Oestrus ovis (Gid worm)	Sheep (Nasal sinuses)	Annoyance to sheep Restless-shaking of head Press nose against objects-mucous nasal exudate-emaciation	Flies deposit larvae on nostril of sheep-larvae migrate toward sinuses -larvae migrate to exterior following cold weather and pupate in ground (3-6 weeks)-fly emerges.
Fasciola sp. (Liver fluke)	Cattle Sheep (*Snails)	Liver damage Secondary infections (bacteria) Because of live and enteric damage Jaundice-gall stones	Eggs-intestine via the bile leave host via feces-maturation takes place within snail. Leave snail, attach to grass-infection takes place per os-migrate to liver.
Histomonas meleagridis (Enterohepatitis) (Blackhead)	Turkeys Chickens *Cecal worm	Emaciation Cyanosis of head Diarrhea Depression Death	Infected birds eliminate protozoa via feces and cecal worm-infection is per os.

*Intermediate Host

INFORMATION SHEET

PARASITE	HOST	SYMPTOMATOLOGY	LIFE CYCLE
Eimeria sp. (Coccidia)	Cattle Sheep Swine Poultry	Diarrhea, bloody Emaciation Anorexia Anemia	Sporulated oocysts ingested-enzymes activate release of sporozoites which penetrate intestinal mucosa and multiply, forming numerous merozoites-reinfect epithelial cells. Sexual reproduction-oocysts eliminated in feces.
Gasterophilus sp. 3 species (Botflies) (Horse bots)	Horse	Toss head, stamp front feet, rub nose on ground or nearby objects Obstruction of stomach outlet	Lay eggs on hairs of throat, legs or nose-larvae develop-enter digestive tract-spend winter in stomach (bots)-passed in feces-become flies in about 1 month-pester horses from July to frost.

ANIMAL HEALTH

UNIT X

TEST

1. Match the terms on the right to the correct definitions.

_____a. Parasitology

_____b. Parasitism

_____c. Obligatory parasitism

_____d. Ectoparasite

_____e. Intermediate host

1. A science dealing with organisms that live on or in other organisms called hosts
2. When one organism suffers (host) one benefits
3. Entire life cycle is parasitic
4. Lives on exterior of the host
5. Host harboring larva or sexually producing organism

2. Discuss in writing the pathogenicity of parasites.

3. Discuss in writing the prevention of parasites.

TEST

4. Discuss in writing insecticide toxicity as to cause, influencing factors, symptoms, and prevention.

5. Discuss in writing three common anthelmintics as to characteristics, toxicity, contraindications, and indications.

6. List external parasites as to host, symptoms, and life cycle.

	Host	Symptom	Life Cycle
Lone star tick			
Mange			
Biting louse			
Horn fly			

TEST

7. List internal parasites as to host, symptoms, and life cycle.

	Host	Symptom	Life Cycle
Stomach worm			
Hookworm			
Large roundworm			
Tape worms			
Liver fluke			

ANIMAL HEALTH

UNIT X

ANSWERS TO TEST

1. a. 1 d. 4
   b. 2 e. 5
   c. 3

2. Discussion should include:
   - A. Effects of parasite depend on
     - 1. Number of parasites--degree of symptomatology
     - 2. Habits
       - a. Migration
       - b. Life cycle
       - c. Carrier form
     - 3. Degree of adaptation
     - 4. Condition of host
       - a. Stress
       - b. Nutrition
       - c. Prevention program
   - B. Pathology produced by
     - 1. Absorption of food intended for host--(tapeworm)
     - 2. Sucking of blood--anemia--(ticks, lice)
     - 3. Tissue damage--(ascarids, lung worms)
     - 4. Mechanical obstruction--(ascarids)
     - 5. Toxin production--(ascarids)
     - 6. Transmission of infectious agents--(swine flu)
   - C. Site of infection
     - 1. Digestive tract
     - 2. Liver
     - 3. Lungs
     - 4. Kidneys
     - 5. Skin

3. Discussion should include:
   - A. Control
     - 1. Prevention of consumption of eggs or larva (good management)
       - a. Pasture rotation--avoid following ruminants with ruminants
       - b. General sanitation--frequent manure removal
       - c. Provide clean feed and water--avoid fecal and urine contamination
       - d. Drainage of low wet areas in pasture and paddocks
       - e. Keep young animals away from older (carrier) animals or pastures where older animals have grazed
       - f. Use of chemotherapeutic agents
         - (1) Dips
         - (2) Sprays
         - (3) Anthelmintics

ANSWERS TO TEST

3. B. Prophylactic chemotherapy
    1. Medication based on knowledge of
        a. Types of parasites present within host
            (1) Laboratory examination of feces of animals suspected of parasitism
            (2) Postmortem examination of one or more animals suspected of parasitism
        b. Physiological action of drugs to be utilized
            (1) Purpose of drug
                (a) Relieve animal of acute parasitism
                (b) Prevent occurrence of acute parasitism
            (2) Most drugs utilized in parasite control have varying degrees of toxicity
        c. Evaluation of condition of animals to be treated
            (1) Elimination of possible infectious or nutritional condition with similar symptomatology
            (2) Extreme unthriftiness due to parasitism may result in death following treatment
        d. Skill in administering drugs
            (1) Proper therapeutic dosage
            (2) Proper route and method of administration
            (3) Knowledge of possible toxic results

4. Discussion should include:
    A. Etiology
        1. Consumption of forage treated with insecticide
        2. Absorption of insecticides applied directly to skin
    B. Influencing factors
        1. Direct application to animal
            a. Recommendations vary with development of new products
            b. Following directions on container
            c. Danger often from misuse
        2. Emulsions may increase quantity deposit and toxicity
        3. Wet table or suspensible powders
            a. Settle and pack
            b. Excessive amounts at end of spraying
        4. Susceptibility
            a. Younger animal most susceptible
            b. Dairy breeds more susceptible than beef--body surface to body weight
            c. Poor physical condition--more susceptible
    C. Symptoms
        1. First more alert
        2. Muscular tremors (shivering)
            a. Stimulated by sharp noise
            b. Begin anteriorly and progress posteriorly
        3. Recumbency--paddling movements
        4. Salivation
        5. Death
        6. Symptoms appear within 48 hours of exposure

ANSWERS TO TEST

4. C. 7. Symptoms vary
   a. Concentration of preparation
   b. Type of preparation
   8. At first signs of symptoms suggestive of insecticide or herbicide poisoning contact a veterinarian
   D. Prevention
   1. Follow instructions on labels of containers

5. Discussion should include:

   A. Phenothiazine
   1. Characteristics
   a. Low solubility in water
   b. Excreted in feces and urine
   c. Purified forms most effective
   d. Relatively ineffective on immature helminths
   e. Smaller particles provide greatest effectiveness
   2. Toxicity
   a. Variable with species, individuals, and environment
   b. Birds and sheep most resistant
   c. Horses most susceptible
   3. Contraindications
   a. Weak
   b. Anemia
   c. Late pregnancy
   4. Photosensitization
   5. Indications
   a. Cattle
   Stomach worms--Haemonchus sp., Ostertagia sp.
   Nodular worm--Oesophagastomum sp., Trichostrongylus sp.
   Hookworm--Bunostomum sp.
   b. Sheep
   Stomach worms--Haemonchus sp., Ostertagia sp., Trichostrongylus sp.
   Nodular worms--Oesophagostomum sp.
   Hookworms--Bunostomum sp.
   Cooperids--Cooperia sp.
   Nematodirus sp.
   c. Poultry
   Cecal worms--Heterakis sp.
   Ascarids--Ascaridia sp.
   B. Piperazine
   1. Characteristics
   a. Urine excretion: 30-40%
   b. Orally--grain, bolus, drench
   c. Deprive of feed or water 22 hours previous to voluntary medication
   d. Mature parasites most susceptible
   2. Toxicity
   a. Relatively nontoxic
   b. Spasmogenic effect on intestine--large doses

ANSWERS TO TEST

5. B. 3. Indications
      - a. Cattle
        - Nodular worms--Oesophagostomum sp.
      - b. Sheep
        - Nodular worms--Oesophagostomum sp.
      - c. Swine
        - Ascarids--Ascaris sp.
        - Nodular worms--Oesophagostomum sp.
      - d. Horse
        - Ascarids--Parascaris sp.
        - Strongyles--Trichonema sp.
          - Triodantophorus sp.
          - Strongylus sp.
        - Pinworms--Oxyuris sp.
      - e. Poultry
        - Ascarids--Ascaridia sp.
        - Cecal worm--Heterakis sp.

   C. Hygromycin B
   - 1. Characteristic
     - a. Antibiotic--Streptomyces hygroscopicus
     - b. Continuous feeding most effective
   - 2. Toxicity
     - a. May impair hearing
     - b. Can be fed to pregnant sows
   - 3. Indications
     - a. Swine
       - Large roundworm--Ascaris sp.
       - Nodular worm--Oesophagostomum sp.
       - Whipworm--Trichuris sp.

   D. Thiabendazole
   - 1. Characteristics
     - a. Broad spectrum activity
     - b. Active against immature and mature worms
     - c. Feed need not be withheld to stimulate consumption
     - d. Inhibits egg production
   - 2. Toxicity
     - a. Wide margin of safety--twenty times overdose produced no problems in cattle
   - 3. Indications
     - a. Ruminants
       - Stomach worms--Haemonchus sp.
         - Ostertagia sp.
         - Trichostrongylus sp.
       - Nodular worm--Oesophagostomum sp.
       - Cooperids--Cooperia sp.
         - Nematodirus sp.
       - Hookworm--Bunostomum sp.
       - Intestinal threadworm--Strongyloides sp
         - Capillaria sp.
       - Large mouth bowel worm--Chabertiva ovina
       - Whipworm--Trichuris sp.

ANSWERS TO TEST

5. D. 3. b. Horse
            Strongyles--bloodworm--Strongylus sp.
            Pinworms
            Ascarids
        c. Swine
            Large roundworms--Ascaris sp.
            Kidney worm--Macrocathorhincus sp.
            Trichina--Trichinella sp.
   E. Tetramisole (Levamisole) Tramisol
      1. Characteristics
         a. Broad spectrum
            Particularly effective on Coopera sp.
            Controls mature and immature worms
            Administered orally, drench or bolus
      2. Toxicity
         a. Wide margin of safety
      3. Indications
         Stomach worms--Haemonchus sp.
            Trichostrongylus sp.
            Ostertagia sp.
         Intestinal worms--Trichostrongylus sp.
            Cooperia sp.
            Nematodirus sp.
            Bunostomum sp.
            Oesophagostomum sp.
         Lung worms--Dictyocaulus sp.
   F. Dichlorvos (Atgard) (Equigard)
      1. Characteristics
         a. Anthelmintic for horses or swine
         b. Provided in resin pellets--sustained release
         c. Palatable
         d. Volatile--following opening of sealed package--should not be stored
         e. Effective on mature and fourth stage larvae
         f. Broad spectrum
      2. Toxicity
         a. Minimum in swine if instructions are followed
         b. Wide margin of safety in horses
      3. Indications
         a. Swine
            Roundworms--Ascaris lumbricoides var. suis
            Nodular worms--Oesophagostomum sp.
            Whipworms--Trichuris suis
         b. Horses
            Bots--Gasterophilus sp.
            Strongyles--Strongylus sp.
            Pinworms--Oxyuris equi sp.
            Roundworms--Para ascaris equi sp.

ANSWERS TO TEST

5. G. Grubicides
    1. Characteristics
        a. Apply immediately after first killing frost
        b. Do not apply less than 14 days before freshening (lactating cows) or before slaughter. Neguvon--21 days before slaughter; do not apply to lactating cows
    2. Toxicity
        a. Sheep generally more susceptible to toxic reactions than cattle
    3. Indications

        Grub control--Hypoderma sp.
        Some gastrointestinal parasites-Haemonchus sp.
            Trichostrongylus sp.
            Cooperis sp.
        Like (Co-Ral)

6. Lone star tick:

Host- All domestic and wild animals, man
Symptoms- Irritation, decreased production, skin abscesses, anemia, screwworm infection, disease vectors
Life cycle- Mate on host, fall to ground, deposit eggs on debris, hatch in about 2 weeks. Seed ticks crawl on plants, attach on passing animal, feed, drop to ground, repeat process until they become adults.

Mange:

Host- Horse (head, neck, shoulders), sheep-seldom, swine (head to entire body)
Symptoms- Skin irritation and inflammation, exudate, rubbing, red papules or vesicles, wool or hair loss, scabs
Life cycle- Burrow in skin, lay egg in tunnel, larvae remain in tunnel or burrow into new areas. Become mature in about 17 days. Can live only few days off host. Spread by contact.

Biting louse:

Host- Horse, cattle, sheep, swine
Symptoms- Weight loss, lowered vitality, mangy appearance, constant rubbing, hair loss, skin irritation, anemia
Life cycle- Eggs laid on hairs and feathers. Hatch 5-8 days. Moult 3-5 times. Become adults 2-3 weeks. Cannot live off host more than several days. Spread by contact.

Horn fly:

Host- cattle (mainly)
Symptoms- Similar to S. calcitrans
Life cycle- Winter as larvae in fecal material, lay eggs in fresh droppings. Eggs hatch, upuate, rebreed in 10-12 days.

ANSWERS TO TEST

7. Stomach worm:

Host- Cattle (abomasum), sheep (abomasum), horse
Symptoms- Digestive distrubances; young animals primarily, watery-profuse diarrhea, anemia, "bottle-jaw" weight loss. Haemonchus-sheep; death before eggs are passed, more susceptible than cattle.
Life cycle- Direct; eggs passed in feces, hatch shortly unless unfavorable conditions, may remain dormant for extended periods.

Hookworm:

Host- Cattle (anterior-small intestine), sheep (jejunum)
Symptoms- Death in young calves, skin scabs-site of larval penetration, anemia, weight loss, edema, blood suckers
Life cycle- Same as Haemonchus, except infection may occur by skin penetration as well as ingestion.

Large roundworm:

Host- Swine (small intestine)
Symptoms- Reduced growth, mechanical obstruction of intestine, occluded bile duct, mechanical damage during arvae migration in liver and lungs, "thumps"-respiratory signs, unthrifty
Life cycle- Female produces 250,000 eggs per day, infective in 2-3 weeks; ingested eggs hatch, larvae hatch in intestine, penetrate wall, enter portal circulation. Grow in liver, then carried to lungs through blood vessels, passed to digestive tract through bronchial tree.

Tapeworms:

Host- Poultry (small intestine), insects, earthworm
Symptoms- Unthrifty, weak, diarrhea possible
Life cycle- Eggs ingested by intermediate host, incubate approximately 3 weeks. Invested intermediary host consumed by bird. Cysticercoid freed by digestive enzymes and attaches to intestinal wall.

(or)

Host- Cattle, sheep, grass mite
Symptoms- Emaciation-rough coat, pot-bellied, edema, anemia, may predispose enterotoxemia
Life cycle- Eggs consumed by grass mites, larva development in mite, mite consumed by host. Larvae liberated in GI tract of host.

Liver fluke:

Host- Cattle, sheep, snails
Symptoms- Liver damage, secondary infections (bacteria), because of live and enteric damage, jaundice-gall stones
Life cycle- Eggs, intestine via the bile leave host via feces, maturation takes place within snail. Leave snail, attach to grass, infection takes place per os, migrate to liver.

ANIMAL BREEDING

UNIT I

REPRODUCTIVE SYSTEM

TERMINAL OBJECTIVE

Upon completion of this unit, the student will be able to divide the reproductive tract according to its functions. The student will be able to identify the parts, trace the hormones, list the relationships of parts and hormones in the reproductive tracts. This knowledge will be evidenced by achieving 85 percent on the test.

SPECIFIC OBJECTIVES

After completion of this unit, the student will be able to:

1. Define, locate and label all terms associated with the reproductive organs and hormones of farm animals.
2. List two items the testicle produces and two structures it contains.
3. Define semen
4. Draw, label and evaluate sperm
5. List four (4) different functions of the epididymis
6. List the main function of the vas deferens
7. List three functions of the seminal vesicles
8. List two functions of the prostrate gland
9. List the four functions of the cowper's gland
10. In writing, tell how the sigmoid flexture functions at the time of copulation, and after copulation
11. Define FSH, LH or ICSH and list what they stimulate and the hormone they cause to be produced
12. List the age of puberty by species and the five major effects
13. List the four functions of the ovary
14. Describe and list two functions of the infundibulum
15. List the site of fertilization

SPECIFIC OBJECTIVES

16. Classify and compare the uterus and uterine horn by specie and embryo development

17. List two items which must pass through the cervix

18. Locate the site of semen deposit by specie.

19. List two functions of the vulva

ANIMAL BREEDING

UNIT I

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheets
2. Provide students with Information and Assignment Sheets
3. Assign selected pages and chapters from reference material for out of class reading
4. Make transparencies
5. Discuss Terminal and Specific Objectives with students
6. Discuss Information and Assignment Sheets with students
7. Give Test

Students:

1. Read Objective Sheets
2. Study Information Sheets and assigned reading
3. Complete Assignment Sheets and turn into instructor for grading
4. Take Test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objective Sheets
2. Information Sheets
3. Transparency Masters

   TM 1 - MALE REPRODUCTIVE SYSTEM

   TM 2 - SEMEN VOLUME & NUMBERS FOR FARM ANIMAL SPECIES

   TM 3 - ANATOMY OF SPERM

   TM 4 - SPECIES DIFFERENCES IN SPERM ANATOMY

INSTRUCTIONAL MATERIALS

TM 5 - GOOD SEMEN

TM 6 - QUESTIONABLE SEMEN

TM 7 - POOR SEMEN

TM 8 - FEMALE REPRODUCTIVE SYSTEM

TM 9 - REPRODUCTIVE TRACT OF A COW

TM10 - REPRODUCTIVE TRACT OF A SOW

TM11 - OVULATION

TM12 - FERTILIZATION IN CATTLE

4. Assignment Sheets

5. Answers to Assignment Sheets

6. Test

7. Answers to Test

References:

Books

1. Sorensen, A.M. Jr. Animal Reproduction: Principles and Practices, 1979. McGraw-Hill, Inc.

2. Fertility and Sterility by Hoard's Dairyman, 1976. Fort Atkinson, Wisconsin 53538

Transparencies:

3. Animal Genetics and Breeding, Overhead Transparency Masters, Vocational Agriculture Service, 434 Mumford Hall, Urbana, Illinois 61801

ANIMAL BREEDING

UNIT I

INFORMATION SHEET

I. Terms and Definitions

A. Castrate - To remove the testicles or ovaries

B. Cervix - Neck of the uterus. Separates the uterus from the vagina, acting as a valve

C. Clitoris - Sensory and erectile organ of the female located just inside the vulva

D. Cryptorchidism - A failure of the mammalian testes to descend into the scrotum

E. Conception - The action of conceiving or become pregnant

F. Copulation - The act of mating

G. Cowper's gland - Secretes a fluid similar to seminal fluid. It is secreted before ejaculation to neutralize and cleanse urethra

H. Ejaculation - A sudden ejection, or discharge, as of semen from the male

I. Endocrine - Pertaining to glands that produce secretions that pass directly into the blood or lymph instead of into a duct. Hormones are secreted by endocrine glands.

J. Epididymis - Long, greatly coiled tube which connects to each testes. It functions in storage, maturation, and transportation of sperm cells

K. Estrus (oestrus) - Recurrent, restricted period of sexual receptivity (heat) in female mammals, marked by intense sexual urge

L. False heat - Display of estrus by a female animal when she is pregnant

M. Fecundation - Impregnation or fertilization

N. Follicle - A small, nearly closed cavity found in the ovary

O. Gonad - Gland which produces the reproductive cells; testicle or ovary

P. Heat period - Period of time in which the female will accept male in the act of mating. Estrous period.

INFORMATION SHEET

Q. Hormone - Chemical substance secreted by an endocrine gland which has a specific effect on the activities of other organs

R. In utero - Within the uterus

S. In vitro - Within an artificial environment, as within a test tube

T. In vivo - Within the living body

U. Libido - Sexual desire or instinct

V. Luteal phase - Stage of the estrus cycle at which the corpus luteum is active and progesterone influence predominates

W. Mount - Copulate with, as certain male animals mount a female in the act of coitus

X. Open - Term used of farm mammals to indicate a nonpregnant status

Y. Ovary - Female reproductive gland in which the ova (eggs) are formed

Z. Oviduct - (Fallopian tubes)two tubes that carry eggs from the ovaries to the horns of the uterus. Lie close to, but are not attached to the ovaries

AA. Ovulation - The shedding of a follicle by the ovary

BB. Ovum - Female reproductive cell which, after fertilization, develops into a new member of the same species

CC. Penis - External organ of male which deposits sperm cells within female reproductive tract

DD. Physiology - Science that pertains to the functions of organs, systems, and the whole living body

EE. Progesterone - Hormone necessary to maintain pregnancy

FF. Prostaglandins - Used to synchronize ovulation

GG. Prostate - Gland in male reproductive system which lies just below the bladder

HH. Puberty - Age at which reproductive organs become functionally operative and secondary sex characteristics develop

INFORMATION SHEET

II. Scrotum - Contains the testes

JJ. Semen - A mixture of sperm and secondary sex gland fluids

KK. Sperm - Mature male germ cell

LL. Spermatic cord - Consists of vas deferens, smooth muscle, blood vessels and nerves. Enclosed in a protective, fibrous sheath

MM. Testes - Male reproductive organ

NN. Urethra - Tube extending from bladder to end of penis. Transportation route for semen and urine; in female, carries urine from bladder to vagina

OO. Uterus - Location where fetus develops

PP. Vagina - Passageway between cervix and vulva

QQ. Vas Deferens - (sperm duct) Tube which transports sperm cells to the urethra of male

RR. Vulva - External opening of the reproductive and urinary tracts of the female

II. Testicle (TM 1)

A. Located outside the body cavity in the scrotum, which regulates temperature

B. Producing spermatoza, the male germ cells (y) chromosomes

C. Producing the specific male hormone, testosterone

1. Interstitial cells of Leydig produce testosterone

D. Normally each male animal possess two testicles carried in the scrotum

E. Contains:

1. Lobules or lobes of the testes that contain long tubules, known as seminiferous tubules

2. The seminiferous tubules join in the rete testes

1. The seminiferous tubules are many long, tiny coiled tubules, within which the sperm are formed and mature

INFORMATION SHEET

3. Throughout and around the seminiferous tubules are:
    1. Connective tissue
    2. Blood capillaries
    3. Interstitial cells of Leydig

F. Connects:
    1. The many hundreds of individual seminiferous tubules united together in the rete testes

III. Semen (TM 2)

A. Mixture of sperm with secondary sex gland fluids

B. Production
    1. At the moment of ejaculation, split-second muscular contractions of the vas deferens and the epididymis propel the sperm into the penis
    2. Secondary glands contract forcing their fluids into the penis mixing with the sperm
    3. Sperm is 20% of total volume in bulls
    4. Most of the fluid comes from the seminal vesicles

IV. Sperm (TM 3,3A)

A. Anatomy
    1. Head
        a. Chromosomes contained in the nucleus of the head
        b. Apical body
        c. Head cap
        d. Cell membrane
        e. Nuclear ring
        f. Post nuclear cap

INFORMATION SHEET

        - g. Nuclear vacuoles
        - h. Nucleus
    - 2. Neck
        - a. Implantation socket
        - b. Implantation plates
        - c. Matrix
    - 3. Body or Midpiece
    - 4. Tail
- B. Species difference (TM 4)
- C. Evaluation of viable semen
    - 1. Services per conception

Good ....1.25 services per conception
Questionable ....2.5 services & 25% abnormal sperm
Poor................more than 3 services

    - 2. Volume of ejaculate X concentration per unit X the percentage of living cells X the percent normal cells = "Good Semen" (TM 5,6,7,)
        - a. Volume (TM 2)
            - 1. per ejaculation in (ml)
            - 2. total sperm per ejaculation (billions)
        - b. Concentration - sperm per mm (TM 2)
            - 1. listed in 1,000's for species
        - c. % living cells or motility
        - d. % normal cells
            - 1. view at 100x magnification
            - 2. shape and size of sperm

INFORMATION SHEET

V. Epididymis (TM 1)

   A. Compact, flat, elongated structure closely attached to one side of the testicle

   B. Transportation

      1. Contains 12 or more vasa efferetia from the testicle which combine into a 130-160 feet long single tubule in the epididymis

   C. Maturation

      1. One week is the time spent by sperm to reach maturity

   D. Concentration of sperm

   E. Storage of sperm

   F. Tail of epididymis widens into a long tube leading to the urethra, this tube is the vas deferens

VI. Vas Deferens

   A. Long tube connecting epididymis and urethra

   B. Pathway of spermatozoa into the urethra

   C. If cut or removed (vasectomy) the animal is sterile

   D. The vas deferens widens and becomes enlarged in the ram and bull at the point it joins the urethra. This enlargement is the ampulla and serves as a temporary storage depot for spermatozoa

   E. Two vas deferens - one from each testicle

   F. The two vas deferens unite into a single tube which becomes the urethra or channel passing through the penis

      1. Common channel for semen and urine

   G. The spermatic cord includes: vas deferens, blood vessels, nerves, support muscles, connective tissue

VII. Seminal Vesicles - One of Three Secondary Sex Glands

   A. One of two glands in the area where vas deferens unite to become the urethra

INFORMATION SHEET

B. Produces the largest fraction of seminal fluid

C. Consists of two four inch lobes connected to urethra by a duct

D. Functions to:

1. Neutralize urine residues

2. Add volume to semen

3. Stimulate activity of spermatozoa

VIII. Prostrate Gland - One of Three Secondary Sex Glands

A. Located near and around the opening of the bladder

B. Secretes nourishment

C. Stimulates activity of sperm

D. Poorly developed in the bull

E. Can become enlarged causing pain and difficulty urinating

IX. Cowper's Gland (bulbourethral glands) on Either Side of the Urethra

A. Small, firm glands located on either side of the urethra

B. Cleanse the urethra of any residue of urine

C. Clear secretions

D. The gelatinous material that forms a plug in the cervix of the sow

E. Adds volume to the semen

X. Penis (TM 1)

A. Organ of insemination

B. Consists of two cylindrical bodies called corpora cavernose penis

1. These are filled with blood during sexual excitement, resulting in erection

INFORMATION SHEET

C. End of penis is glans penis

    1. Richly supplied with nerves

D. The posterior portion of the urethra is S-shaped and is known as the sigmoid flexure

    1. At the time of copulation, the sigmoid flexure straightens extending the penis beyond the sheath

    2. Retractor muscles relax at copulation and contract after copulation, drawing the penis back into the sheath

E. Is protected by the sheath

XI. Gonadotropic releasing hormone (GNRH)

A. Is secreted by the hypothalamus or the anterior lobe of the pituitary gland located under the brain at the base of the skull

B. At about 6 to 9 months in a bull calf. The pituitary gland secretes Follicle-Stimulating Hormone (FSH) and Luteinizing(LH) or (Interstitial Cell Stimulating Hormone (ICSH)) which stimulates spermatogenesis and interstitial cells of the testes to produce testosterone which causes puberty in male animals

XII Testosterone

A. Produced by interstitial (set between) cells of Leydig of the testicle

B. Major effects

    1. Responsible for development and maintenance of the male reproductive tract. The level of testosterone in the blood regulates the secretion of the gonadotropic hormones by means of a feedback mechanism

    2. Responsible for development and maintenance of secondary sex characters of the male, i.e. heavily muscled shoulders of bulls, tusks of the boars, spurs and combs of the roosters, coarse hair.

    3. Major factor in normal sex drive (libido)

    4. Increases muscular and skeletal growth

    5. Essential for normal sperm formation

C. Puberty as related to hormone production

    1. Puberty = Libido (sex drive) + sperm production + sex organ development

INFORMATION SHEET

2. Age at puberty

Male	Months	Range (mos)
Bull	10	6-18
Ram	7	4-12
Boar	6	4-8
Stallion	18	12-24

XIII. Ovaries (TM 8,9,10)

A. Each of the two ovaries are oval to bean shaped organs located in the abdominal cavity

B. Functions

1. Production of the female reproductive cells, i.e. egg or ovum

2. Production of eggs by a process called oogenesis which is cyclic (estrus cycle) in the female

3. Contains (TM 11)

    a. Primary follicles - numbering several thousand structures which contain germ cells surrounded by a layer of cells

    b. Potential to mature into an egg, however, most die and are absorbed by the ovary

    c. Developmental phases

        1. Layers of cells added to single layer surrounding the egg until a central cavity forms. This starts 16 to 18 days after a heat period in cows and the pituitary gland at the base of the brain begins to release "follicle stimulating hormone" (FSH) into the blood stream to the ovary. FSH causes follicle to grow for 3 to 5 days in cows

        2. Egg attached by the stalk of cells to back side of follicles

        3. Side opposite egg bulges and becomes thin

        4. Follicle is mature and called Graafian follicle. As it grow larger, the follicle secretes more and more female sex hormone, estrogen

INFORMATION SHEET

5. At ovulation, the "high" level of estrogen cause the pituitary to stop releasing FSH and start releasing a burst of "luteninizing hormone" (LH). The blood carries the LH to the ovary causing the thin portion to rupture and to release the contents and the egg. Ovulation occurs 10-16 hours after the end of standing heat

d. Following ovulation, cells within the follicle (TM 11) form the corpus luteum (yellow bodies) which produce more and more progesterone.

XIV. Infundibulum (TM 12)

A. Funnel-shaped membrane at the end of oviducts

B. Catches the released egg

C. Moves the egg into the oviducts (Fallopian tubes)

XV. Oviducts (Fallopian tubes) (TM 12)

A. Lined with microscopic cilia or ("hair" projections). These assist in moving the egg or ovum toward the uterine horn

B. Egg remains viable for only a few hours

C. Site of fertilization by one sperm which must be present when the egg arrives. Moves from the oviducts into the uterus within 3 or 4 days

XVI. Uterus and Uterine Horn (TM 12)

A. In the cow, ewe, and sow the uterus is short and poorly developed while uterine horn is long and well developed, but just the opposite for the mare

1. Embryo develops in the uterine horn in the cow, ewe, and sow species, and the embryo develop in the uterus of the mare

2. The embryo develops into a fetus within a layer of membrane called a placenta

a. No direct blood connection between fetus to mother

INFORMATION SHEET

        b. Nourishment from mother to fetus is diffused

        c. Length: sow - 5-7 feet long uterine horn
           cows and mares - short uterine horns

XVII. Cervix

- A. Neck of the uterus
- B. Thick walls
- C. Opening into the uterus through which sperm must pass to fertilize the egg
- D. Opening through which the young must pass from the uterus at birth
- E. 2 to 3 inches long in cow and ewes and longer in sows and mares
- F. Is picked up through the rectal wall by A.I. inseminator
- G. Sphinctere muscles tightly closed to protect uterus from infection

XVIII. Vagina

- A. Receptacle for male penis; portion of reproductive tract between vulva and cervix
- B. Semen is deposited in vagina near the cervix in the cow and ewe, however in the mare and sow, a portion of the semen is deposited in the uterus and the cervix may be penetrated
- C. Urinary bladder opens through the urethra which opens into the vagina
- D. 12 to 16 inches long
- E. External opening of the vagina is called the vulva

XIX. Vulva

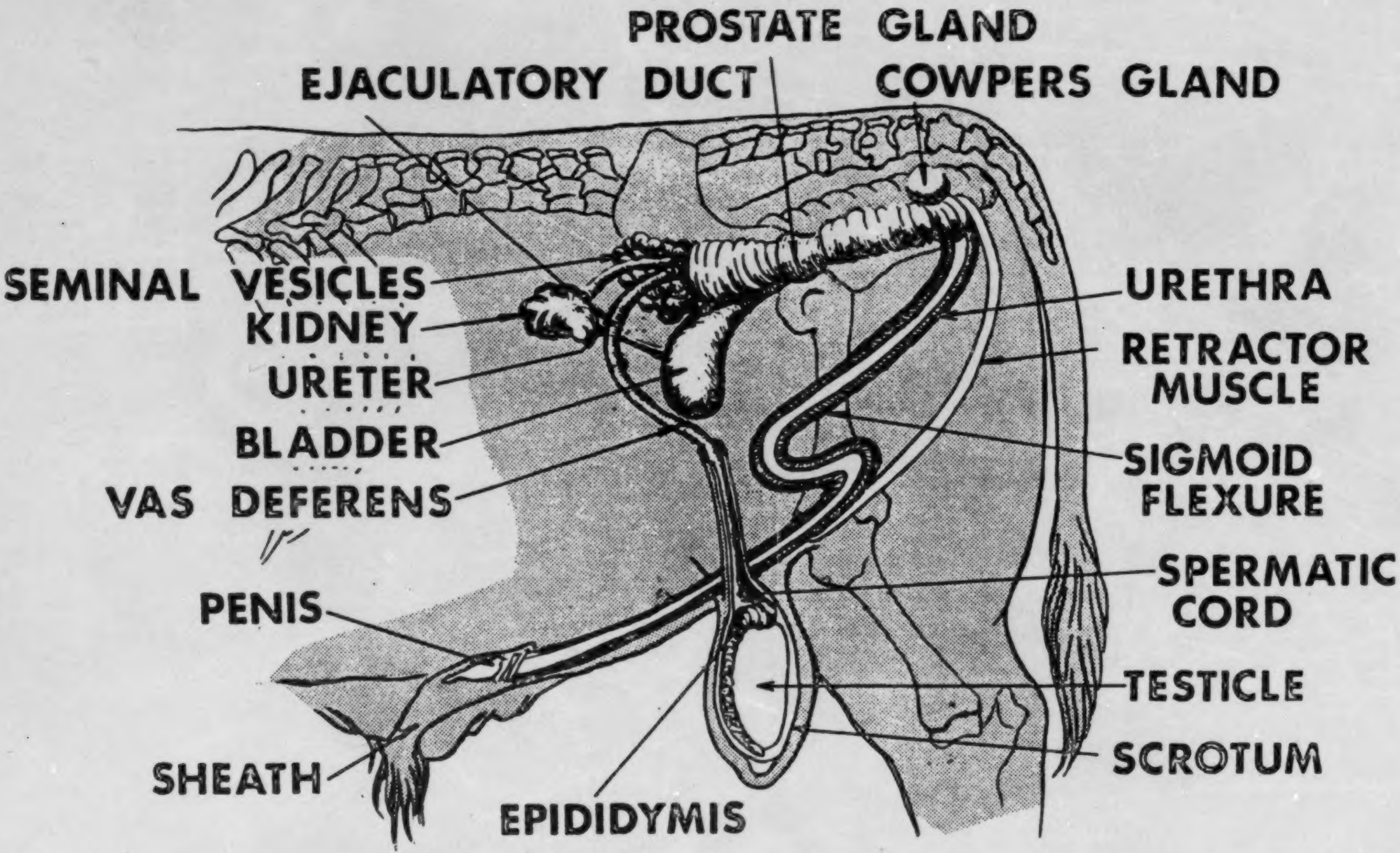
- A. Exterior portion of the female reproductive tract
- B. Organ from which urine is eliminated
- C. Organ of copulation

INFORMATION SHEET

D. Parts of vulva:

1. Vestibule: passageway from vulva to vagina
2. Clitoris: small organ at the head of the vulva similar to the glans penis, richly supplied with nerves.

MALE REPRODUCTIVE SYSTEM



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From Lesson Plans for Voc. Agr. Instructors, Texas A & M University

SEMEN VOLUME & NUMBERS FOR FARM ANIMAL SPECIES

Animal	Vol. per Ejaculate (ml.)	Sperm per mm. (1,000's)	Total Sperm per Ejaculate (billions)	No. Females Bred per Ejaculate
boar	150-250	100	15-25	10-12
bull		1,000	3-5	100-600
rooster	0.6-0.8	3,000	1.8-2.4	
ram	0.8-1.0	1,000	0.8-1.0	40-100
stallion	70-100	100	7-10	8-12

Vocational Agriculture Service – College of Agriculture – University of Illinois at Urbana-Champaign (Breeding 7)
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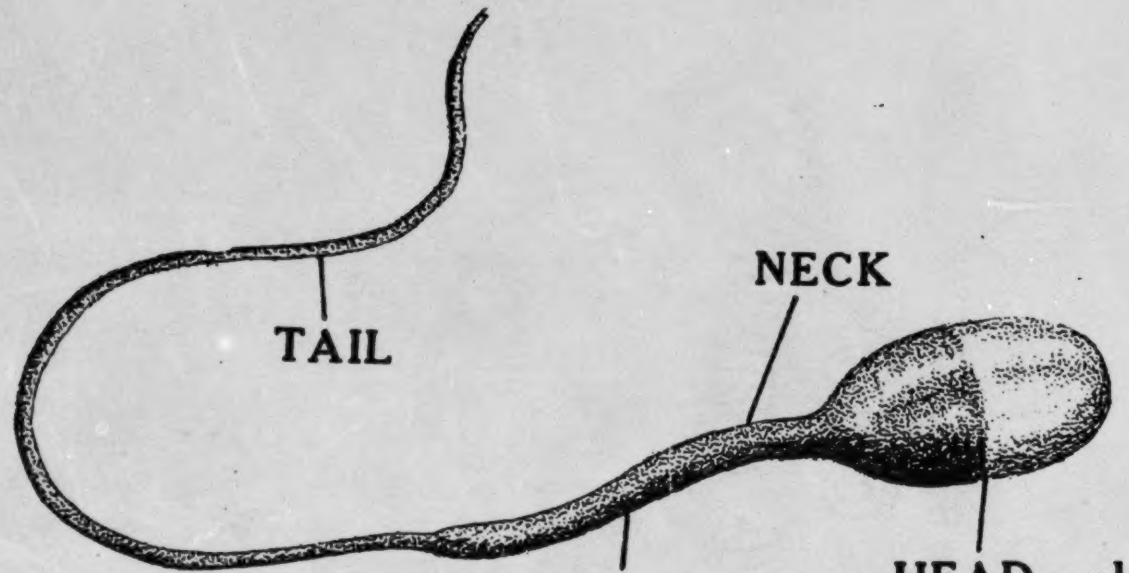
ANATOMY OF SPERM



HEAD - chromosomes
contained in
nucleus of head

Vocational Agriculture Service – College of Agriculture – University of Illinois at Urbana-Champaign (Breeding 8)
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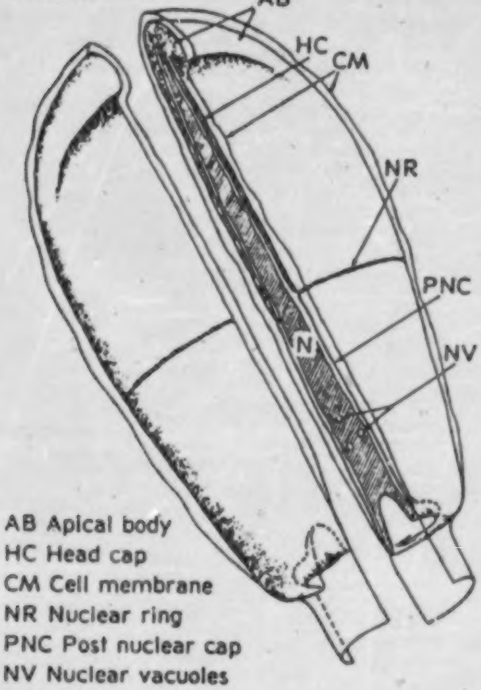
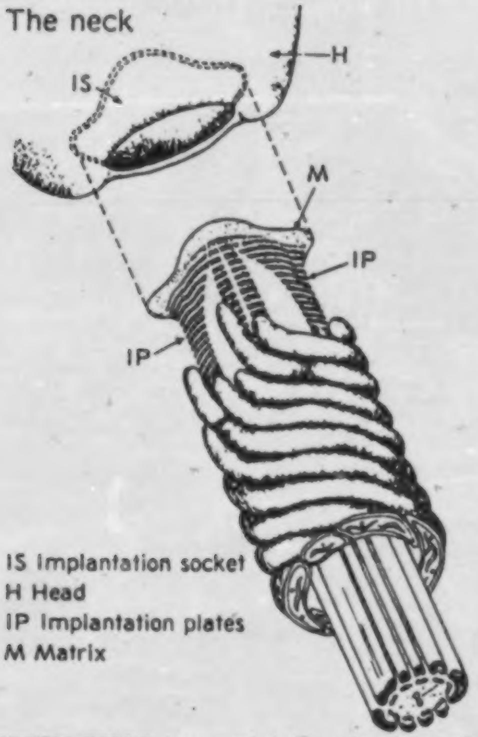
The head



AB Apical body
HC Head cap
CM Cell membrane
NR Nuclear ring
PNC Post nuclear cap
NV Nuclear vacuoles
N Nucleus

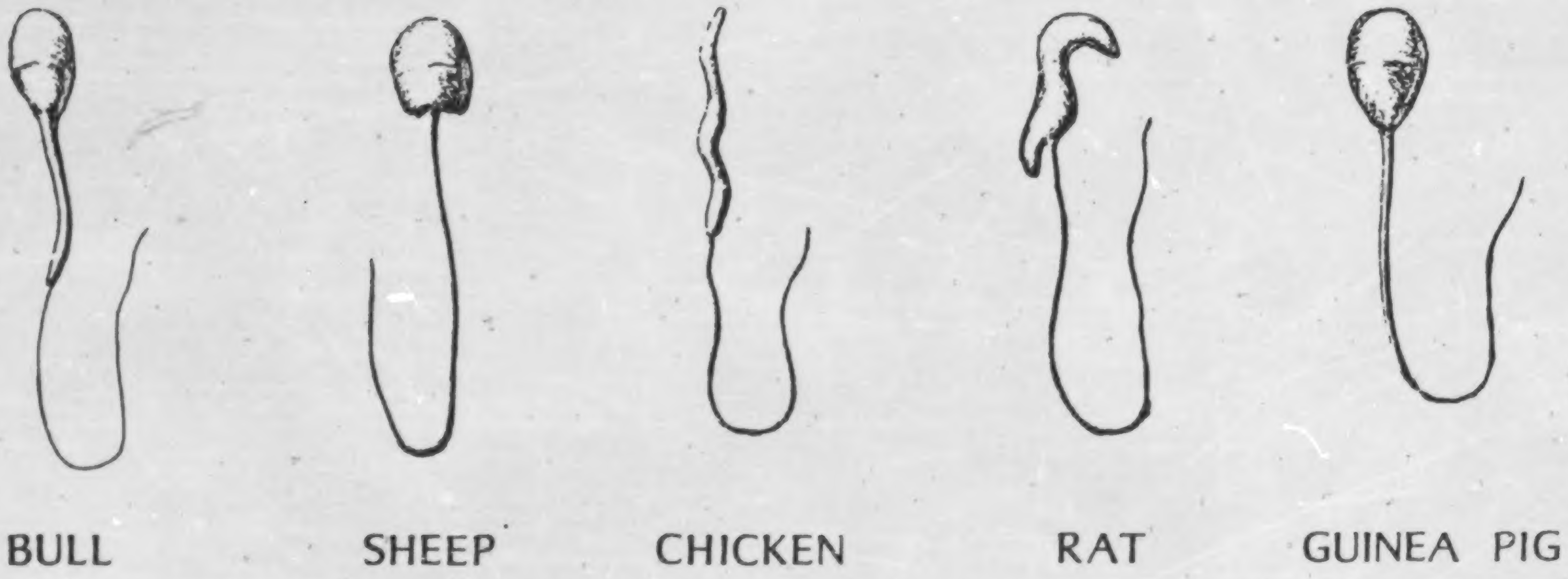
The neck



IS Implantation socket
H Head
IP Implantation plates
M Matrix

SPERM CELLS are complex. Two drawings refer to the head and neck. Letters point out various parts: AB — apical body, HC — head cap, CM — cell membrane, NR — nuclear ring, PNC — post nuclear cap, NV — nuclear vacuoles, and N — nucleus. In the neck portion: IS — implantation socket, H — head, IP — implantation plates.

SPECIES DIFFERENCES IN SPERM ANATOMY



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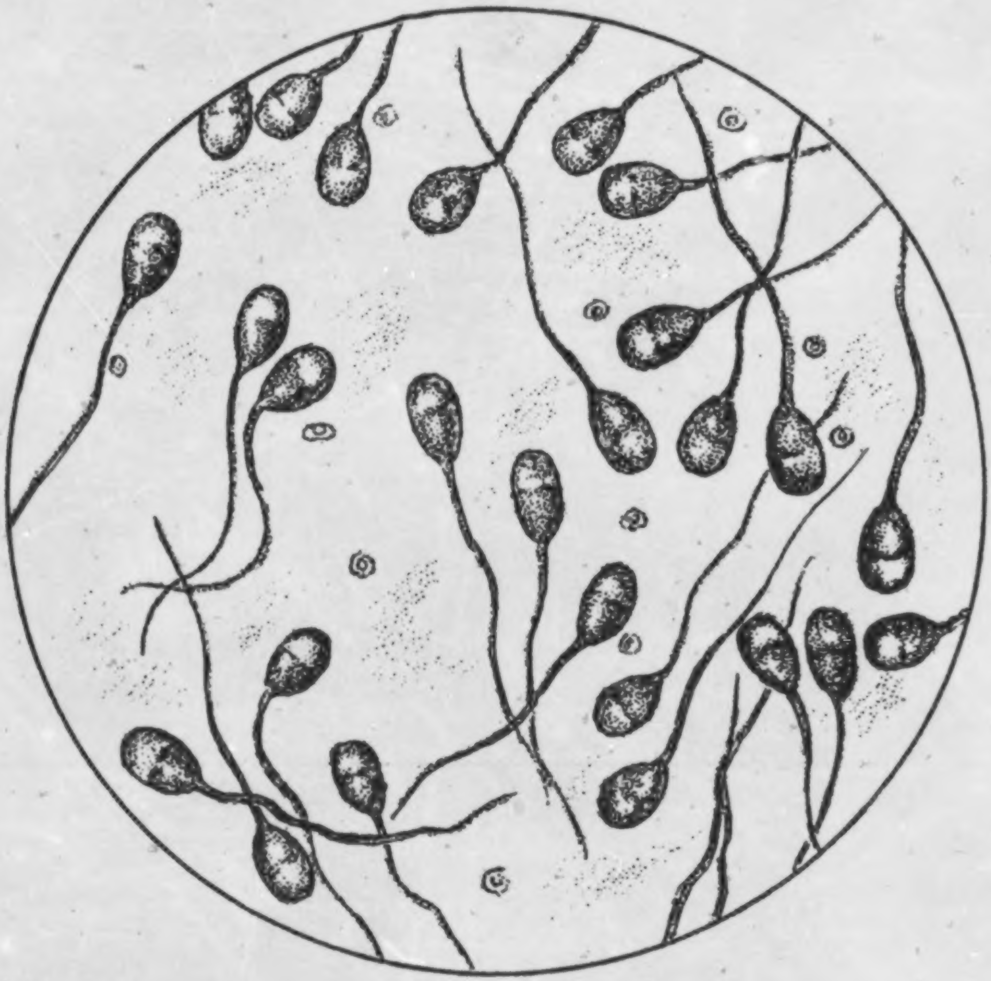
GOOD SEMEN



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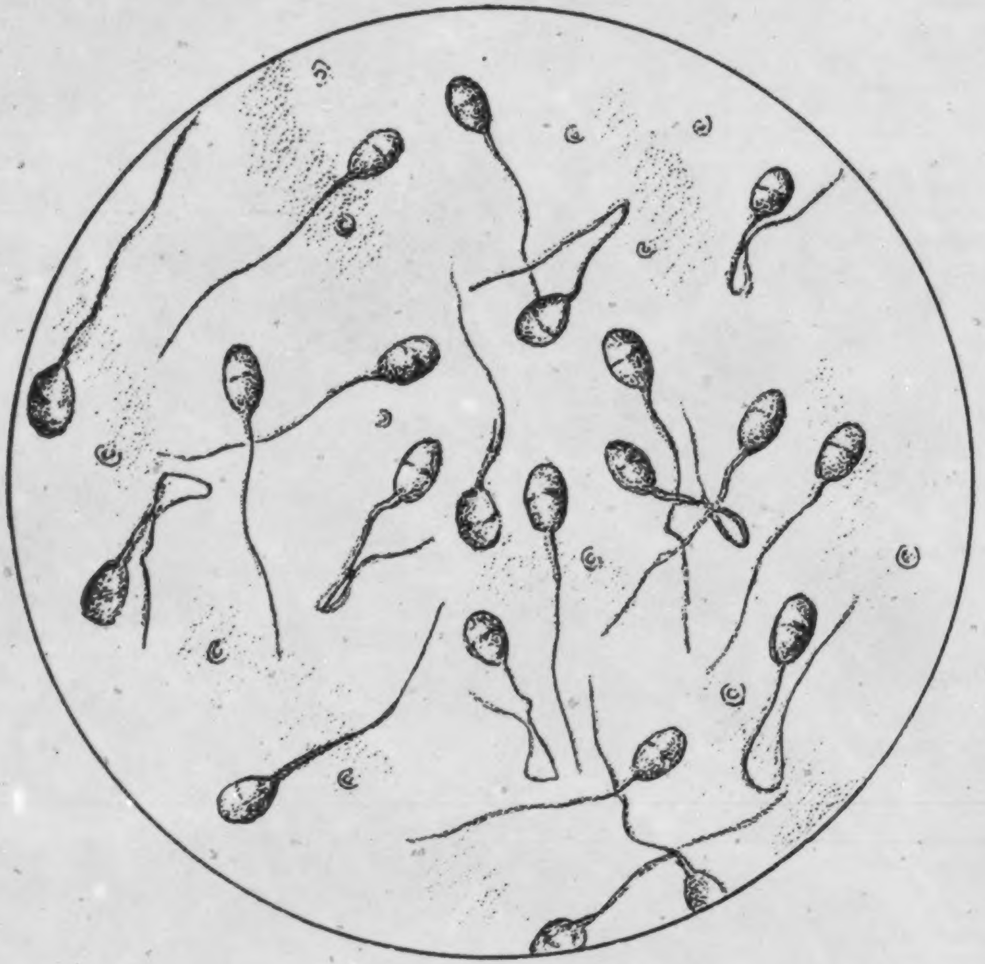
QUESTIONABLE SEMEN



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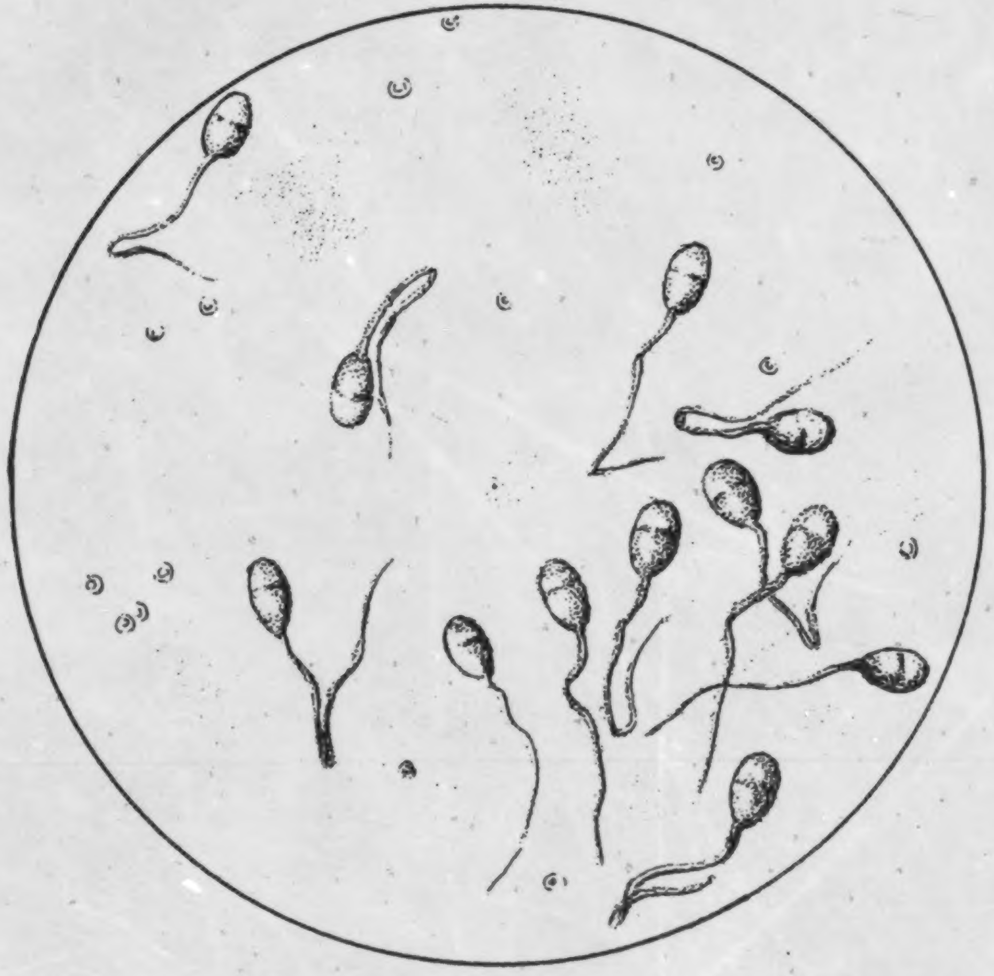
POOR SEMEN



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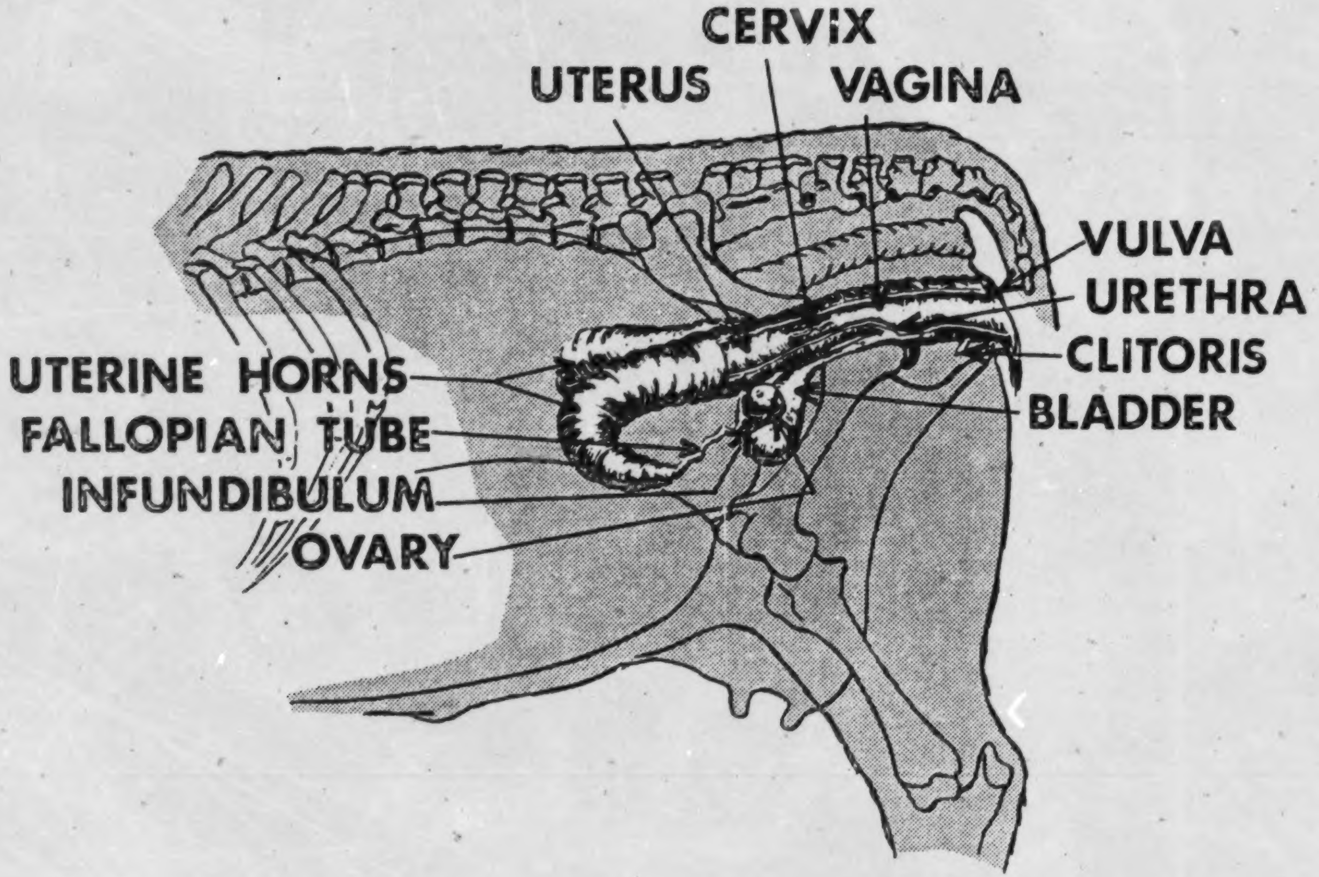
FEMALE REPRODUCTIVE SYSTEM



Vocational Agriculture Service – College of Agriculture – University of Illinois at Urbana-Champaign (Breeding 2)
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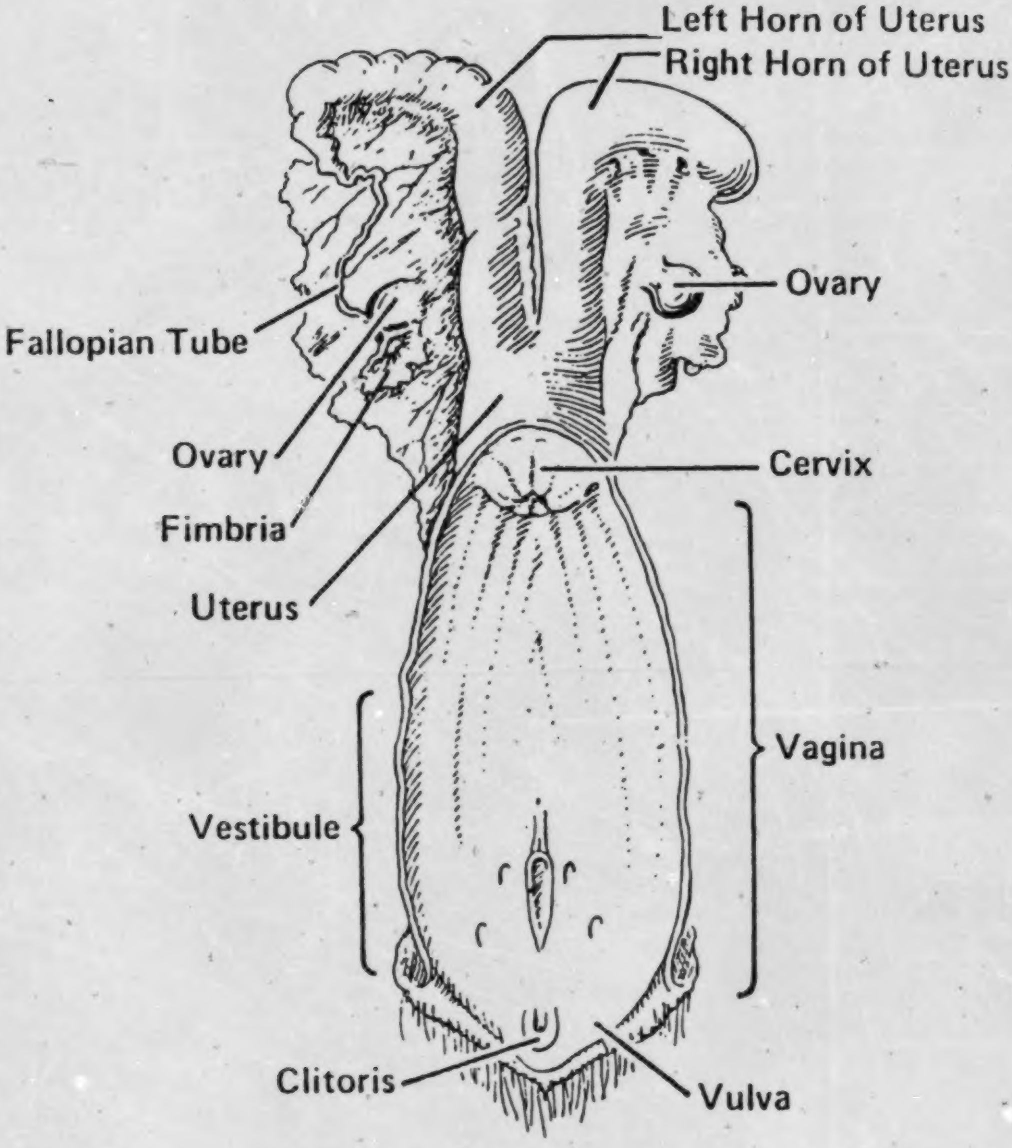
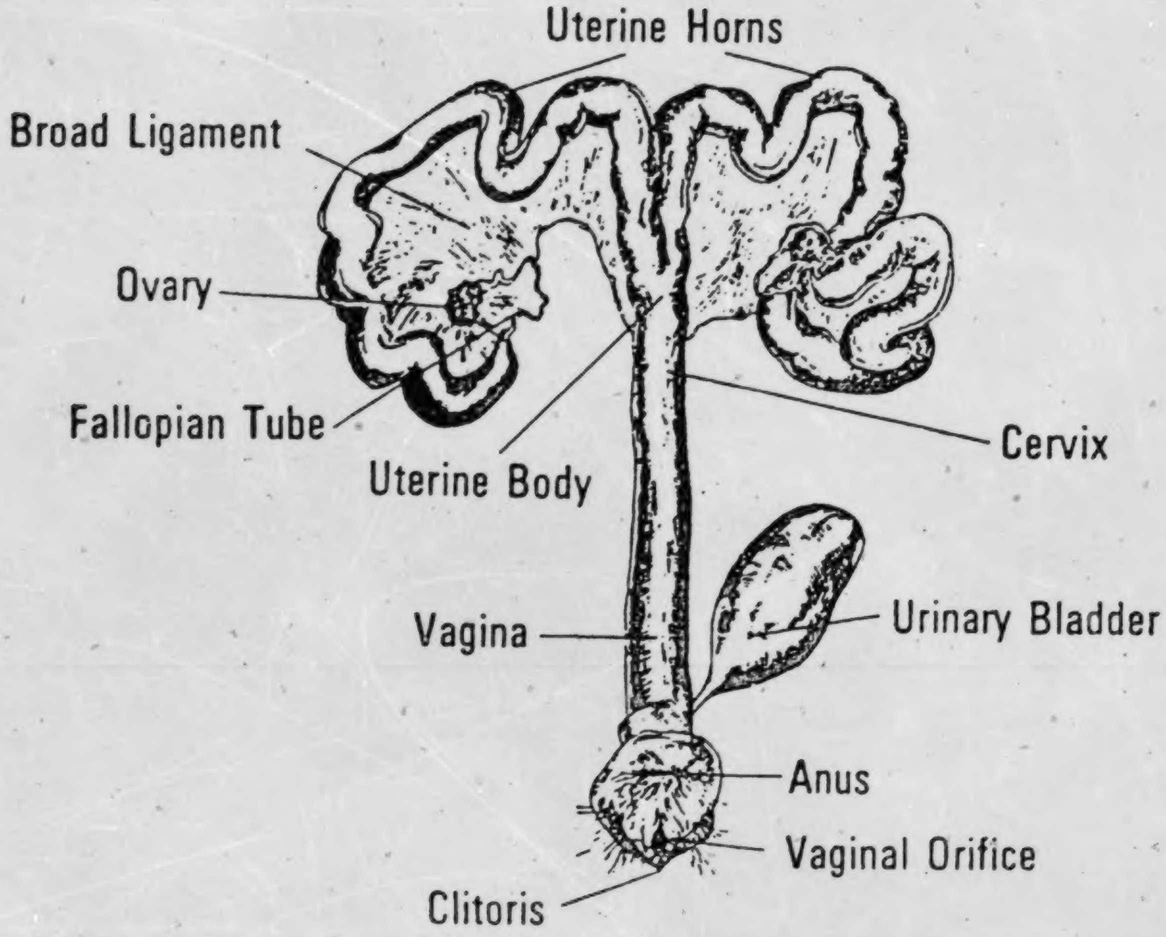
Reproductive Tract of a Cow

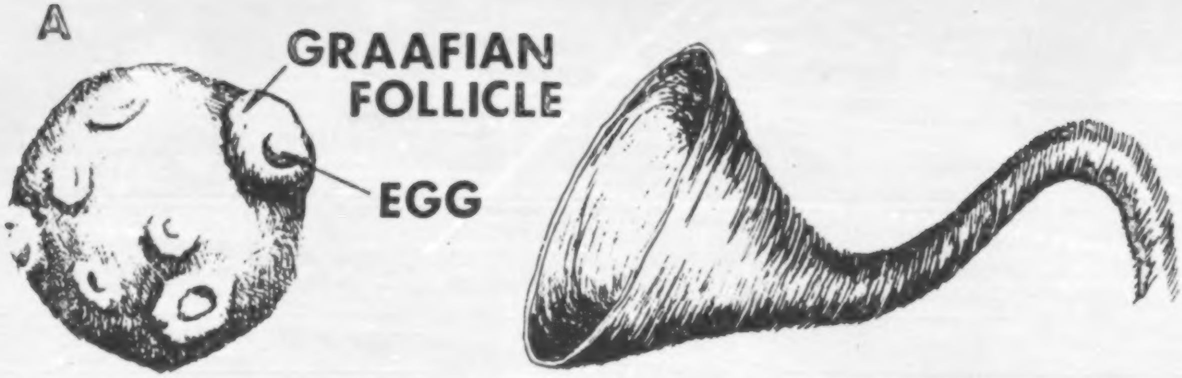


Reproductive Tract of a Sow

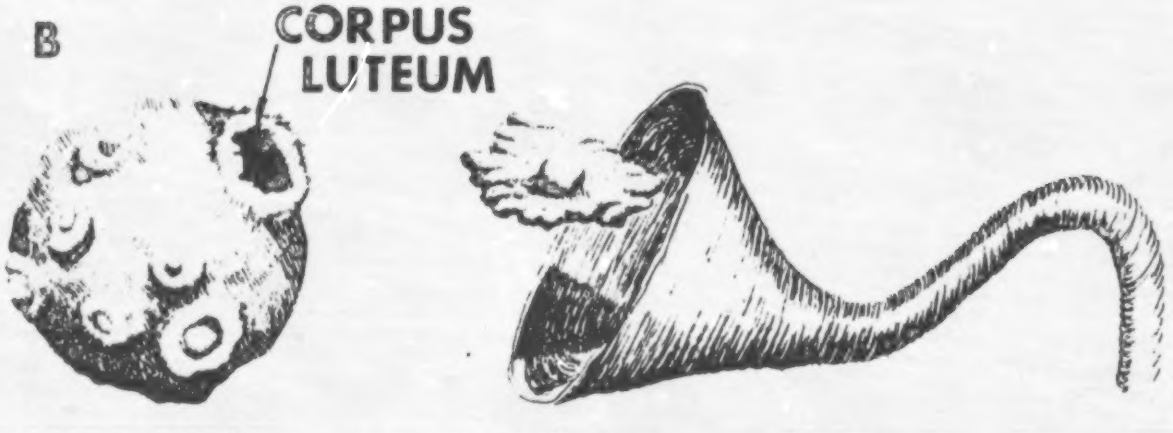


#11

OVULATION



OVARY (DURING HEAT)



OVARY (NOT IN HEAT)

Vocational Agriculture Service – College of Agriculture – University of Illinois at Urbana-Champaign (Breeding 4)
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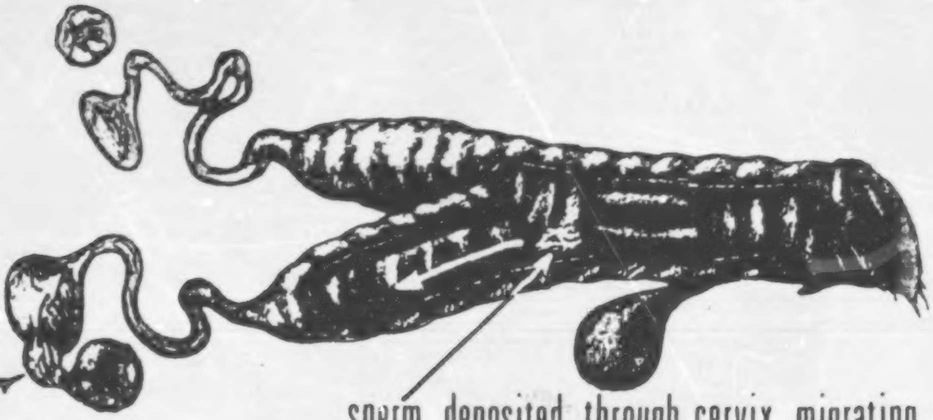
3
12

FERTILIZATION IN CATTLE

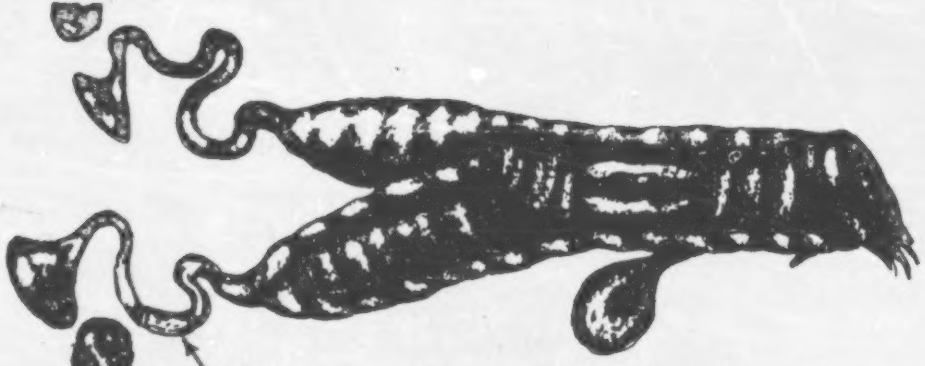
1.



egg passing through infundibulum into fallopian tube

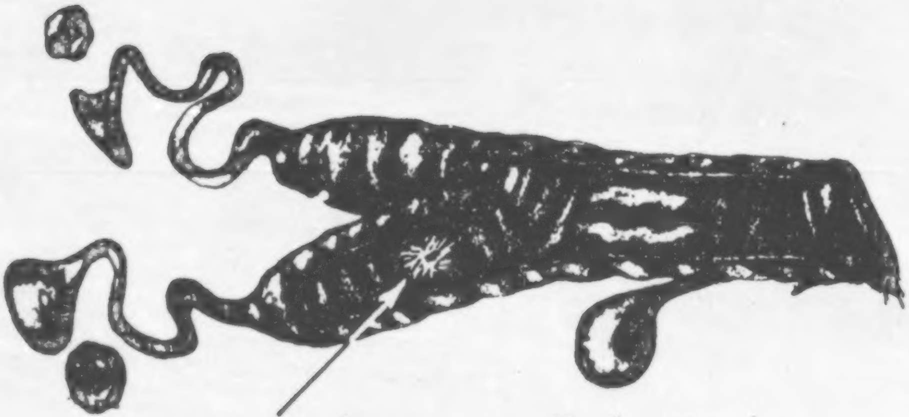
sperm deposited through cervix, migrating through uteran horn into fallopian tube

2.



union of sperm and egg and migration of zygote to uterus

3.



attachment of zygote to wall of uteran horn

Vocational Agriculture Service – College of Agriculture – University of Illinois at Urbana-Champaign (Breeding 5)
From Lesson Plans for Voc. Agr. Instructors, Texas A & M University

ANIMAL BREEDING

UNIT I

ASSIGNMENT SHEET #1: Male Reproductive System and Sperm Pathway.

1. Draw and label the male reproductive system.

2. Trace or list the path of sperm from beginning to being deposited in the cow.

ANIMAL BREEDING

UNIT I

ASSIGNMENT #2: Sperm Evaluation

3. Draw and label the parts of the sperm.

4. Draw semen and evaluate the three major factors for good, questionable and poor semen.

ANIMAL BREEDING

UNIT I

ASSIGNMENT SHEET #3: Female Reproductive System and Egg Pathway

5. Draw and label the female reproductive system.

6. Trace or list the path of the egg from beginning to birth.

ANIMAL BREEDING

UNIT I

ANSWERS TO ASSIGNMENT SHEETS

1. Refer to transparency #1

2. A. The testicle produces spermatozoa in the lobes that contain long tubules called seminiferous tubules

   B. seminiferous tubes unit in the rete teste

   C. from rete testes

   D. to the epididymis

   E. to vas deferens

   F. the two vas deferens join

   G. at the urethra

   H. the urethra is the channel passing through the penis

3. Refer to transparency #3 and 3A

4. Refer to transparency # 5, 6, and 7

	Services per conception	Volume	Concentration
Good	1.25	Boar 150-250 ml.	Boar 100,000 per mm
Questionable	2.5	< 150 ml.	< 100,000 per mm
Poor	> 3	-	-

5. Refer to transparency #8, 9, or 10.

6. Refer to transparency # 11,12.

   1. Inside Graafian follicle on the egg
   2. Into the infundibulum or funnel to the
   3. fallopian tube
   4. Union of egg and sperm to become a zygote
   5. Migrate to the uterus
   6. Attachment of zygote to wall of uterus horn
   7. Pass through cervix
   8. through vagina
   9. through vulva.

ANIMAL BREEDING

UNIT I

TEST

1. Match the following terms and their definitions or example.

a. vas deferens
b. urethra
c. epididymis
d. Cowper's gland
e. prostate
f. copulation
g. ejaculation
h. libido
i. puberty
j. fecundation
k. clitoris
l. vulva
m. vagina
n. urethra
o. cervix
p. ovum
q. follicle
r. oviduct
s. ovary
t. uterus

1. Secretes fluid before ejaculation to cleanse urethra
2. Long, coiled tube
3. Lies below the bladder
4. Sexual desire or instinct
5. The act of mating
6. When sex characteristics develop
7. Separates the uterus from the vagina
8. Carries urine from bladder to vagina
9. Passageway between cervix and vulva
10. Fallopian tubes
11. Closed cavity in the ovary
12. Female reproductive gland
13. Tube from bladder to end of penis
14. Sperm duct
15. Discharge
16. Impregnation or fertilization
17. External opening
18. Sensory organ
19. Female reproductive cell
20. Location where fetus develops

TEST

2. List two different substances the testicle produces

   a.

   b.

3. Define semen.

4. Draw and label the four major parts of a sperm.

5. List the four major functions of the epididymis.

   a.

   b.

   c.

   d.

6. List the main function of the vas deferens.

7. List three functions of the seminal vesicles.

   a.

   b.

   c.

TEST

8. List two functions of the prostrate gland.

a.

b.

9. List the four functions of the cowper's gland.

a.

b.

c.

d.

10. In 50 words, tell how the sigmoid flexture functions at the time of copulation and after copulation.

11. FSH, LH or ICSH stimulates

a. ______________ b. _____________ to produce c. _____________

which causes d. _____________ in male animals.

TEST

12. List the age of puberty for the following species:

Species	Months	Range (mos.)
Bull		
Ram		
Boar		
Stallion		

13. List the four functions of the ovary.

a.

b.

c.

d.

14. List the two functions of the infundibulum.

a.

b.

15. List the site of fertilization.

16. List the location of embryo development.

	Species	Location
a.	Cow	
b.	Ewe	
c.	Sow	
d.	Mare	

17. List two items which must pass through the cervix.

a.

b.

TEST

18. Locate the site of semen deposit by specie:

	Specie	Location
a.	Cow	
b.	Ewe	
c.	Mare	
d.	Sow	

19. List two functions of the vula.

a.

b.

20. From the drawing of the male reproductive tract, identify the lettered parts.

a.

b.

c.

d.

e.

f.

g.

h.

21. From the drawing of the female reproductive tract, identify the lettered parts.

a.

b.

c.

d.

e.

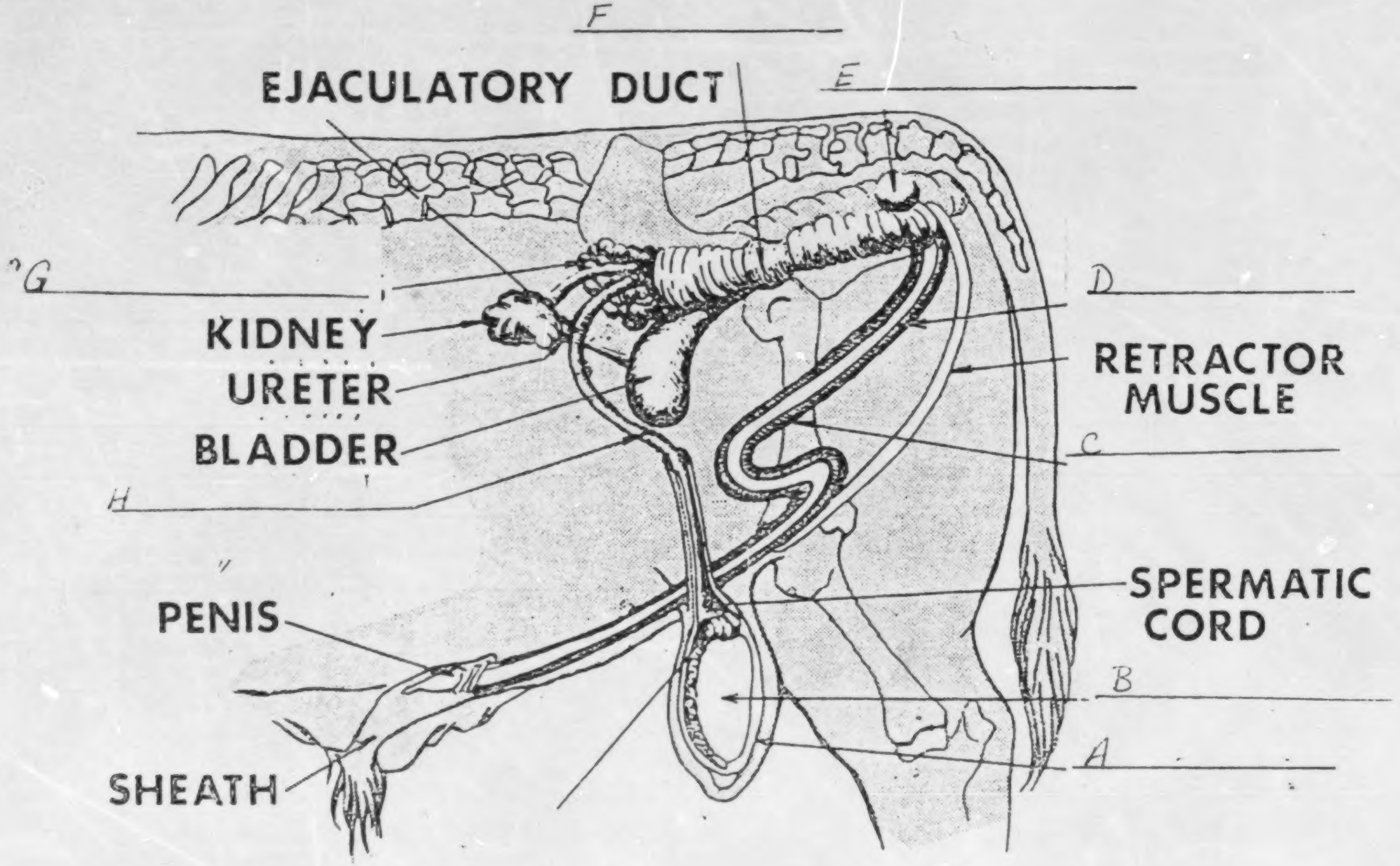
f.

g.

h.

20
18

MALE REPRODUCTIVE SYSTEM



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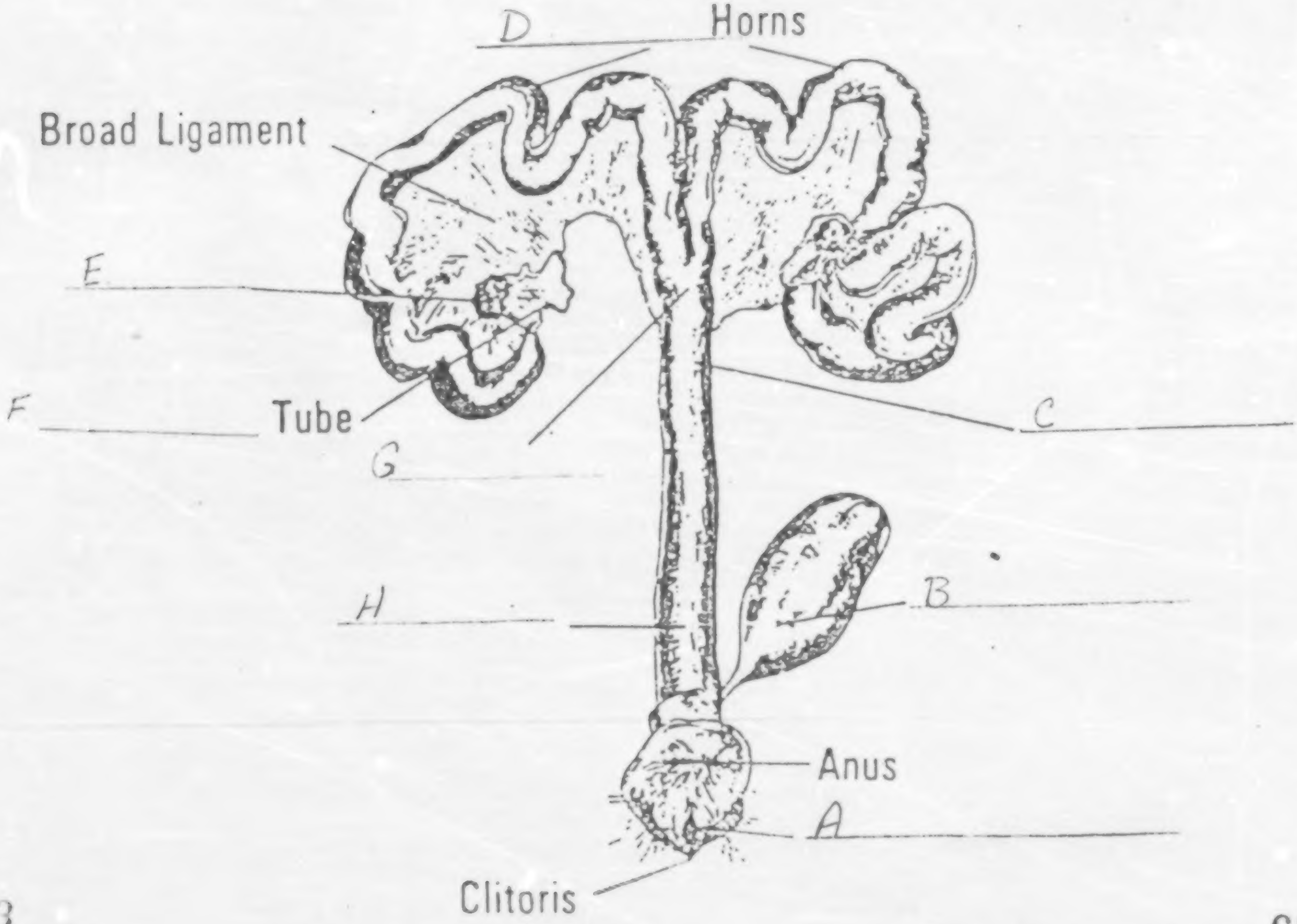
21

Reproductive Tract of a Sow



ANIMAL BREEDING

UNIT I

ANSWERS TO TEST

1. a. 14
   b. 13
   c. 2
   d. 1
   e. 3
   f. 5
   g. 15
   h. 4
   i. 6
   j. 16
   k. 18
   l. 17
   m. 9
   n. 8
   o. 7
   p. 19
   q. 11
   r. 10
   s. 12
   t. 20

2. a. spermatozoa   b. testosterone

3. Mixture of sperm with secondary sex gland fluids

4. Refer to transparency #3. Head, neck body and tail.

5. a. transportation
   b. site of maturation
   c. concentration
   d. storage

6. Long tube connecting epididymis and urethra and forming the pathway for the spermatozoa to the urethra.

7. a. neutralize urine residues
   b. add volume to semen
   c. stimulate activity of spermatozoa

8. a. secretes nourishment
   b. stimulates activity of sperm

9. a. cleanse urethra of any residue of urine
   b. clear secretions
   c. forms a gelatinous plug in the cervix of the sow
   d. adds volume to the semen

ANSWERS TO TEST

10. a. At the time of copulation, the sigmoid flexture straightens therefore extending the penis beyond the sheath. Retractor muscles relax at copulation allowing the sigmoid flexture to straighten.

    b. The Retractor muscles contract after copulation therefore drawing the penis back into the sheath and the posterior portion of the urethra forms its S-shape or sigmoid flexture.

11. a. spermatogenesis
    b. interstitial cells of the testes
    c. testosterone
    d. puberty

12.

Species	Month	Range (mos.)
Bull	10	6-18
Ram	7	4-12
Boar	6	4-8
Stallion	18	12-24

13. a. production of female reproductive cells
    b. production of eggs by process of oogenesis
    c. contains follicles
    d. contains corpus luteum

14. a. catch egg
    b. move the eggs into the oviducts (fallopian tubes)

15. oviducts (fallopian tubes)

16. a. uterine horn
    b. uterine horn
    c. uterine horn
    d. uterus

17. a. sperm
    b. young or offspring

ANSWERS TO TEST

18. a. vagina
    b. vagina
    c. portion in uterus and cervix
    d. portion in uterus and cervix

19. a. organ from which urine is eliminated
    b. organ of copulation

20. a. scrotum
    b. testicle
    c. sigmoid flexure
    d. urethra
    e. Cowper's gland
    f. prostate gland
    g. seminal vesicles
    h. vas deferens

21. a. vaginal Orifice
    b. urinary bladder
    c. cervix
    d. uterine horns
    e. ovary
    f. fallopian tube
    g. uterine body
    h. vagina

ANIMAL BREEDING

UNIT II

THE ESTRUS, ESTRUS CYCLE, AND HORMONES

TERMINAL OBJECTIVE

Upon completion of this unit, the student will be able to identify, list, trace and detect symptoms of estrus, estrus cycle and their corresponding hormones in the female animal. This knowledge will be evidenced by achieving 85 percent on the test.

SPECIFIC OBJECTIVES

After completion of this unit, the students will be able to:

1. Define all terms associated with estrus, estrus cycle and their hormones
2. List the length of estrus, and seven symptoms of estrus in a cow
3. List the length of estrus, cycle duration, and five symptoms of estrus in a ewe
4. List the length of estrus, cycle duration, and five symptoms of estrus in a sow
5. List the length of estrus, cycle duration and five symptoms of estrus in a mare
6. Chart the estrus cycle by days for **cows** starting at day 0, or standing heat, listing the activities of the parts of female reproductive system and include LH, estradiol and progesterone hormones
7. List where FSH is produced, when it is released and its functions.
8. List where estrogen is produced, four effects and two functions
9. List where LH is produced and its two functions
10. List where progesterone is produced and its three functions
11. List where and when oxytocin is produced and its two functions

ANIMAL BREEDING

UNIT II

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheet
2. Provide students with Information and Assignment Sheets
3. Assign selected pages and chapters from reference material for outside class reading
4. Make transparencies
5. Discuss Terminal and Specific Objectives with students
6. Discuss Information and Assignment Sheets with students
7. Give Test

Students:

1. Read Objective Sheet
2. Study Information Sheets and assigned reading
3. Complete Assignment Sheets and turn into instructor for grading
4. Take class notes
5. Take Test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objective Sheet
2. Information Sheets
3. Transparency Masters

   TM 1 - ESTRUS CYCLE HORMONES

   TM 2 - SEQUENCE OF EVENTS IN COW REPRODUCTIVE CYCLE

   TM 3 - TIME OF BREEDING AND CONCEPTION RATE IN CATTLE

   TM 4 - THE REPRODUCTION CYCLE IN FARM ANIMALS

INSTRUCTIONAL MATERIALS

4. Assignment Sheet
5. Answers to Assignment Sheet
6. Test
7. Answers to Test

References:

1. Fertility and Sterility, Hoard's Dairyman. Fort Atkinson, Wisconsin.
2. Sorensen, A.M. Jr. Animal Reproduction Principles and Practices, 1979, McGraw-Hill, Inc.

Transparencies

3. Animal Genetics and Breeding. Overhead Transparency Masters, Vocational Agriculture Service, 434 Mumford Hall, Urbana, Illinois 61801.

ANIMAL BREEDING

UNIT II

INFORMATION SHEET

I. Terms and Definitions

   A. Conception - The action of conceiving or become pregnant

   B. Endocrine - Pertaining to glands that produce secretions that pass directly into the blood or lymph instead of into a duct. Hormones are secreted by endocrine glands

   C. Estrus (Oestrus) - Recurrent, restricted period of sexual receptivity (heat) in female mammals, marked by intense sexual urge. (Noun is estrus, adjective is estrous)

   D. False heat - Display of estrus by a female animal when she is pregnant

   E. Heat period - Period of time in which the female will accept male in the act of mating (Estrous period)

   F. Luteal phase - Stage of the estrus cycle at which the corpus luteum is active and progesterone influence predominates

   G. Open - Term used of farm mammals to indicate a nonpregnant status

   H. Ovulation - The shedding of a follicle by the ovary

   I. Oxytocin - Milk let down hormone and is active for quick birth

   J. Progesterone - Hormone necessary to maintain pregnancy

II. Bovine or the Cow

   A. Polyestrous animal because she cycles continuously

   B. Length of estrus is 16 hours

   C. Symptoms of estrus in the cow

      1. Stand to be mounted by other animals

      2. Will attempt to mount other animals

      3. Mucus smeared on tail, buttocks, and vulva

      4. Nervous

INFORMATION SHEET

5. Seek a bull
6. Rubbed tailhead or mud on the hips indicates she has been ridden
7. Chin on rump of other cows, tail raising, excessive urination

III. Ewe

A. Seasonally polyestrous female

1. Cycles normally at 17 day intervals from mid-fall to early spring
2. Breed influence
    a. Fine-wool breeds of Rambouillet and Merino cycle year-around
3. Length of estrus is 30 hours
4. Cycle duration is 16-17 days

B. Symptoms of ewe

1. Stand to be mounted
2. Search out the ram
3. Vulva will swell due to water retention due to estrogen
4. Nervous and bleats for her mate
5. Dock or cutoff tail moves rapidly from side to side

IV. Sow

A. Sow is polyestrous

B. Length of estrous period is usually 44 hours but may range from 1-5 days

C. Cycles normally at 21 days

D. Symptoms

1. Stand to be mounted
2. Nervous and grunting

INFORMATION SHEET

3. Some sows will attempt to mount other females

4. Some mucus on the vulva

5. Swollen vulva - engorged with blood and fluid

V. Mare

A. Seasonally polyestrous starting in January through March

B. Length of estrus is 5 to 6 days but will accept stallion for only 2 days

C. Cycle is 21 days

D. Symptoms

1. Will stand to be mounted by stallion

2. Nervousness

3. Will show interest in stallion but resist any approaches; frequent urination

4. Increased nervousness, kicking at stallion, squats, urinates followed by winking motion of the vulva in which the lips open and close

5. Finally, quiets in the presence of the stallion, raises her tail, squats, urinates and winks the vulva

VI. Estrus Cycle for Cows (See TM 1, 2, 3)

A. Day 0 - Cow is in estrus (standing heat). Near the end of estrus, the Graafian follicle ovulares (ruptures) in response to a surge of LH released by the pituitary gland.

B. Day 1-2 LH is the primary hormone that causes the cells that formerly lined the follicle to change to leutein cells of the corpus luteum

C. Day 2-5 Corpus luteum grows rapidly in size and function

D. Day 5-16 - Corpus luteum grows to maximum size about day 12. It secretes the hormone progesterone which blocks LH release by the pituitary gland

E. Day 16-18 - The corpus luteum regress rapidly due to luteolytic activity of the uterus

INFORMATION SHEET

F. Day 18-19 - Corpus luteum is now nonfunctional. This releases the blocking action of progesterone. One of many follicles grows very rapidly and becomes the one active follicle. As it reaches maturity the Graafian follicle grows and secretes increasing amounts of estrogen.

G. Day 19-20 - With the increase in estrogen released by the Graafian follicle and a strong decrease in progesterone produced by the regressing corpus luteum, estrus or heat will occur. The estrus cycle has now returned to Day 0.

H. Note: If the egg is fertilized and begins developing in the uterus, then the corpus luteum does not regress but produces progesterone preparing the cow for quiet favorable conditions.

VII. Follicle Stimulating Hormone (FSH) (See TM 1)

A Produced by portion of pituitary gland

B. Is released 16 to 18 days after a heat period

C. Is carried by the blood to the ovaries

D. Its function is to stimulate the growth of the follicle - usually one follicle on one ovary

1. To maturity in 3 to 5 days by multiplying layer cells and accumulation of follicle fluid which is rich in estrogen

2. Produces estrogen for 10 to 11 days to bring on signs of heat (estrus).

VIII. Estrogen - Female Steriod Hormone: Estradiol, Estrone, Estroil. (See TM 1)

A. Produced by Graafian follicle

B. Effects

1. Responsible for development and function of the secondary sex organs

2. Responsible for estrus (onset of heat) or period of sexual receptivity (libido)

3. Affects rate and type of growth, especially fat

4. Prepares prepuberal females for onset of sexual activity

INFORMATION SHEET

C. Highest* amounts in blood stream 2 days before estrus and starts to decline on the day of estrus

* Highest means only 10 parts per trillion parts

D. "Stop" Follicle Stimulating Hormone

E. Acts as a triggering mechanism for the release of LH.

IX. Luteinizing Hormone (LH) (See TM 3)

A. The pituitary releases a burst of LH

B. The blood carries the LH to the ovary

C. Causes the follicle to rupture or ovulate and release the egg

1. Ovulation in cows occurs 10 to 16 hours after the end of standing heat

D. LH stimulates the old follicle cells to grow very rapidly to replace the follicle with a corpus luteum (yellow body) which is even larger than the follicle

1. Corpus luteum produces progesterone or pregnancy hormone

X. Progesterone (See TM 3)

A. Produced by luteal cells of the corpus luteum

B. Includes progesterone and pregnanediol

C. Causes a period of calm for development of fertilized ovum

D. Maintains a balance within the system

E. Stimulate alveoli tissue in the mammary system

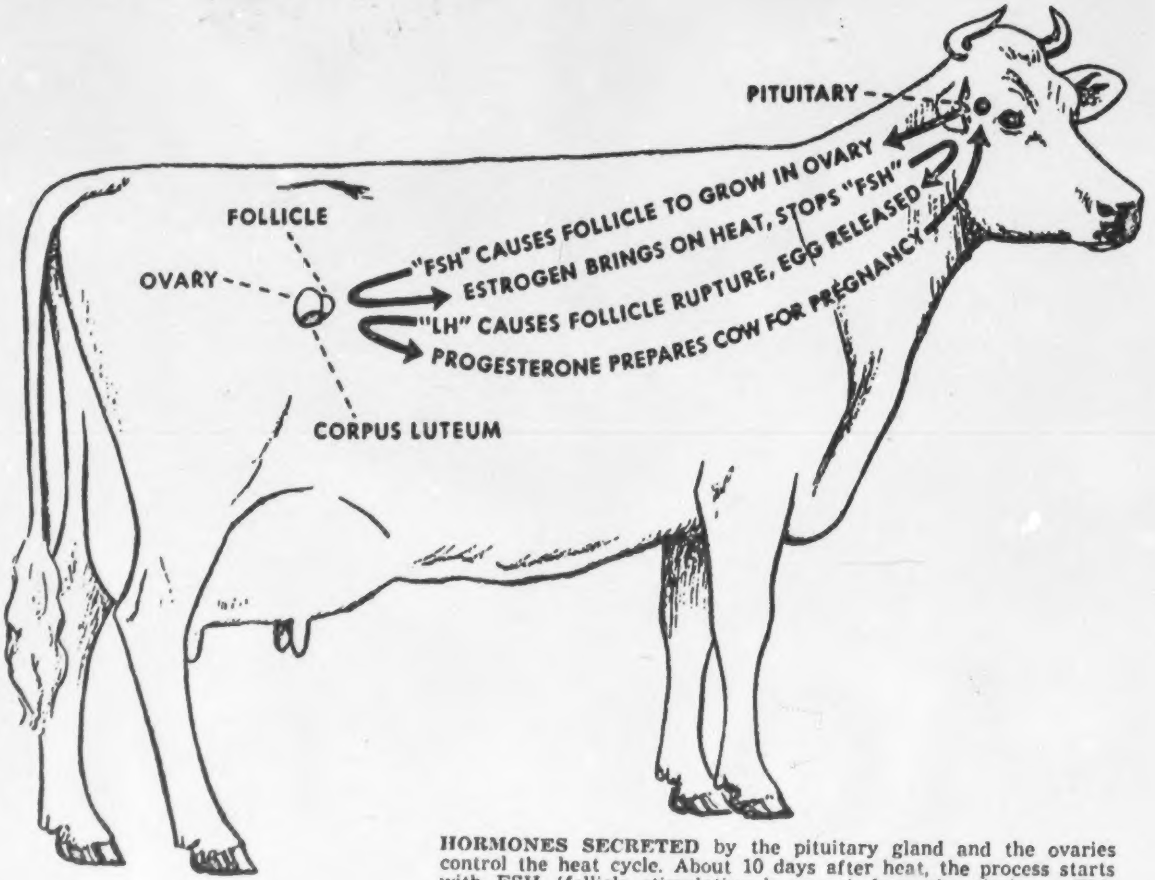
XI. Oxytocin (milk let-down hormone in females and is active for quick birth)

A. Produced by the hypothalamus and stored from the posterior pituitary

B. Released at the time of breeding

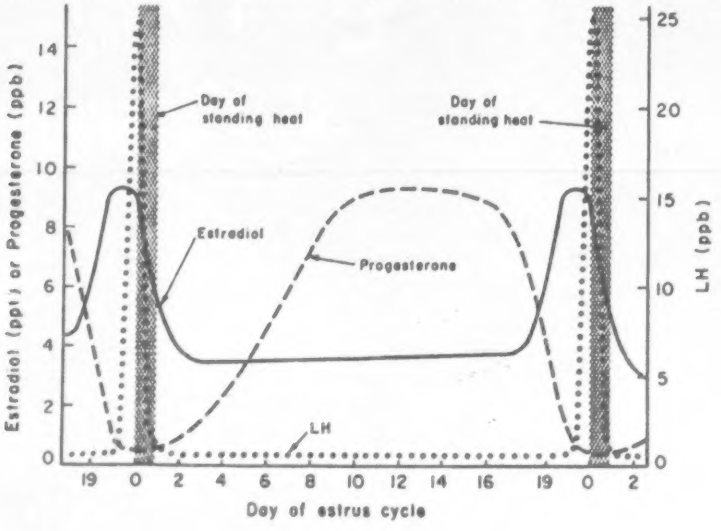
C. Aids in contractions of the smooth muscles in the uterus and in the transportation of sperm from vagina to the oviduct

D. Causes uterine contractions which expel a calf at partuation

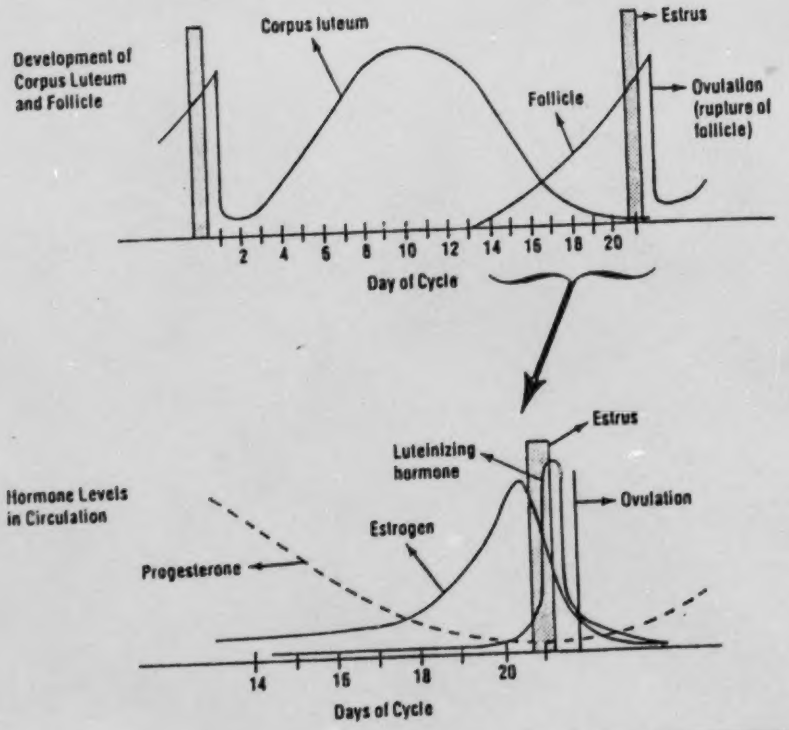

PITUITARY
"FSH" CAUSES FOLLICLE TO GROW IN OVARY
ESTROGEN BRINGS ON HEAT, STOPS "FSH"
"LH" CAUSES FOLLICLE RUPTURE, EGG RELEASED
PROGESTERONE PREPARES COW FOR PREGNANCY
FOLLICLE
OVARY
CORPUS LUTEUM

HORMONES SECRETED by the pituitary gland and the ovaries control the heat cycle. About 10 days after heat, the process starts with FSH (follicle stimulating hormone) from the pituitary. This starts growth of egg-carrying follicle on ovary. Then follicle secretes the female sex hormone (estrogen), which finally (in 10 to 11 days) produces signs of heat, stops FSH. Then pituitary secretes LH (luteunizing hormone), which causes follicle to rupture, releasing the egg about 10 to 16 hours after heat. Then LH also causes corpus luteum (yellow body) to replace follicle. It produces the pregnancy hormone. If egg is not fertilized, LH secretion stops, and the heat cycle is repeated.

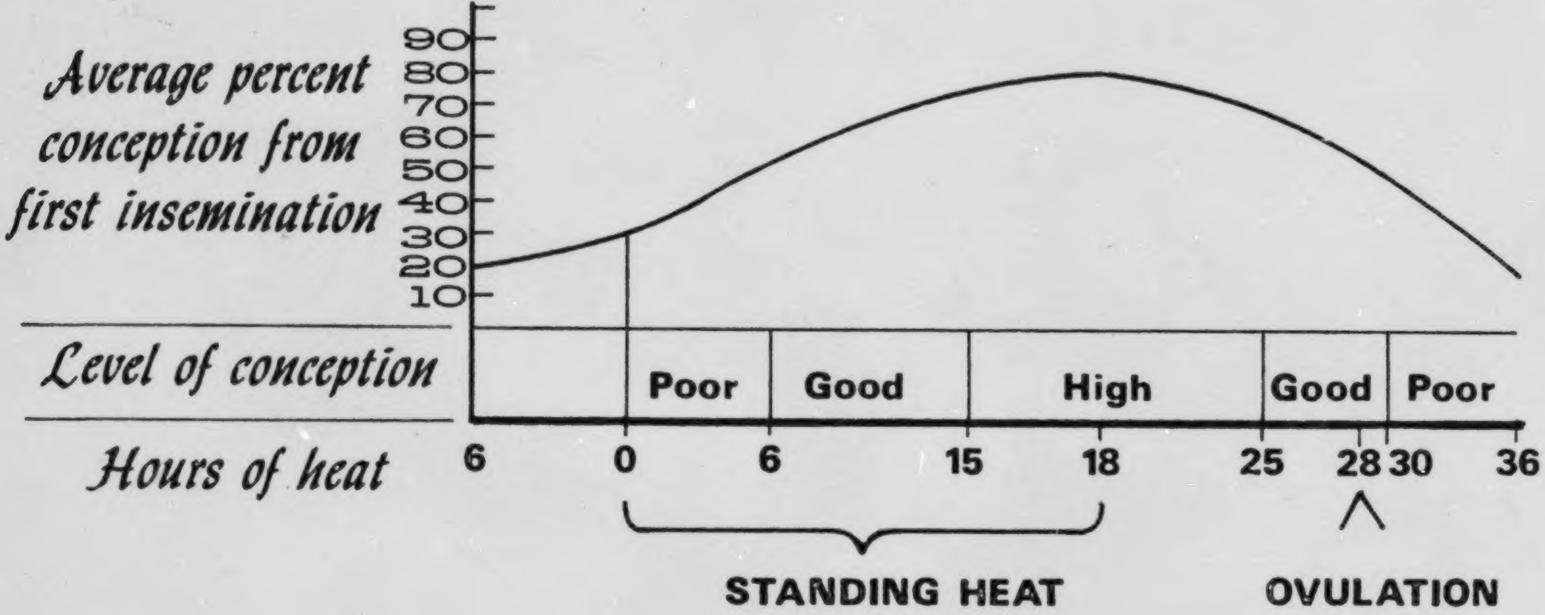
LH, estradiol and progesterone in cows blood serum during the estrus cycle



Sequence of Events in Cow Reproductive Cycle



TIME OF BREEDING AND CONCEPTION RATE IN CATTLE



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From Lesson Plans for Voc. Agr. Instructors, Texas A & M University

THE REPRODUCTION CYCLE IN FARM ANIMALS

Species	Length of Estrus Cycle (days)		Length of Estrus		Usual Time of Ovulation	Length of Gestation (days)		Age at Puberty (months)
	av.	range	av.	range		av.	range	
mare	21	10-37	5-6 days	1-14 days	24-48 hrs. before end of estrus	336	310-350	10-12
cow	19-21	16-24	16-20 hrs.	8-30 hrs.	10-14 hrs. after end of estrus	281	274-291	4-8
ewe	16	14-20	30 hrs.	20-42 hrs	1 hr. before end of estrus	150	140-160	4-8
sow	21	18-24	1-5 days	1-5 days	18-60 hrs. after estrus begins	112	111-115	5-7

Vocational Agriculture Service – College of Agriculture – University of Illinois at Urbana-Champaign (Breeding 36)
From Lesson Plans for Voc. Agr. Instructors, Texas A & M University

ANIMAL BREEDING

UNIT II

ASSIGNMENT SHEET #1: Reproductive Cycle

1. Chart the reproductive cycle in farm animals.

Specie	Length of Estrus		Length of Estrus		Usual time of Ovulation	Length of gestation	
	Cycle (Av.)	(days) (range)	(Av.)	Range		(Av.)	Range
Mare	21	10-37	5-6 days	1-14 days	24-48 hrs before end of estrus	336	310-350
Cow							
Ewe							
Sow							

2. Chart the estrus cycle by days for cows starting at day 0, or standing heat, for the hormones LH, estradiol, and progesterone in cows blood serum.

ANIMAL BREEDING

UNIT II

ANSWERS TO ASSIGNMENT SHEET

1. Refer to transparency #4

2. Refer to transparency #2 or point VI. Estrus cycle for cows which is listed in summary form by day.

ANIMAL BREEDING

UNIT II

TEST

1. Match the following terms and their definitions

a.	Progesterone	1.	Stimulates the growth of follicle
b.	Oxytocin	2.	Maintain balance and calm during gestation
c.	FH	3.	Active for quick birth
d.	Estrogen	4.	Cause follicle to rupture and stimulate old follicle cells to become corpus luteum
e.	LH		
		5.	Produced by Graafian follicle

2, 3, 4 and 5. Chart the length of estrus, duration of estrus cycle and symptoms of estrous by specie.

	Species	Length of Estrus	Estrus cycle duration	Symptoms
2.	Cow	________	21 days	________
3.	Ewe	30 hours	______	________
4.	Sow	________	______	________
5.	Mare	________	______	________

6. Estrus cycle for cows. Fill in the blanks.

Day 0 - Cow is in estrus (standing heat). Near the end of estrus, the Graafian follicle ovulares (ruptures) in response to a surge of (a)____________ released by the pituitary gland.

Day 1-2 This is the primary hormone that causes the cells that formerly lined the follicle change to leutein cells of the corpus luteum

Day 2-5 Corpus luteum grows rapidly in size and function

ANIMAL BREEDING

UNIT II

TEST

Day 5-16 Corpus luteum grows to maximum size about day 12. It secretes the hormone (b) __________ which blocks LH release by the pituitary gland.

Day 16-18 The corpus luteum regress rapidly due to luteolytic activity of the uterus

Day 18-19 Corpus luteum is now nonfunctional. This releases the blocking action of progesterone. One of many follicles grows very rapidly and becomes the one active follicle. As it reaches maturity the (c) ___________ follicle grows and secretes increasing amounts of (d) ___________

Day 19-20 With the increase in estrogen released by the Graafian follicle and a strong decrease in progesterone produced by the regressing corpus luteum, estrus or heat will occur. The estrus cycle has now returned to Day 0.

Note: If the egg is fertilized and begins developing in the uterus, then the corpus luteum does not regress but produces (e) ____ _______ preparing the cow for quiet favorable conditions.

7. List where FSH is produced.

8. List four effects of estrogen

   a.

   b.

   c.

   d.

9. List two functions of Luteinizing(LH)

   a.

   b.

TEST

10. List three functions of progesterone.

a.

b.

c.

11. List the two functions of oxytocin.

a.

b.

ANIMAL BREEDING

UNIT II

ANSWERS TO TEST

1. a. 2
   b. 3
   c. 1
   d. 5
   e. 4

2. 16 hours 21 days mount animals

3. 30 hours 17 days stand to be mounted

4. 44 hours 21 days stand to be mounted

5. 5 to 6 days 21 days stand to be mounted

6. a. LH - luteinizing hormone
   b. Progesterone
   c. Graafian
   d. Estrogen
   e. Progesterone

7. Pituitary gland

8. a. Development of secondary sex organs
   b. Responsible for estrus
   c. Affects rate and type of growth
   d. Prepares prepuberal females for onset of sexual activity

9. a. Causes the follicle to rupture
   b. Stimulates the old follicle cells to grow
   to replace the follicle with corpus luteum
   c.

10. a. Causes a calm period for development of zygote
    b. Maintain a balance
    c. Stimulate alveoli tissue in the mammary system

ANSWERS TO TEST

11. a. Aids in contraction of smooth muscles in the uterus

    b. Causes uterine contractions which expels a calf at partuation.

ANIMAL BREEDING

UNIT III

BREEDING MANAGEMENT: ARTIFICIAL INSEMINATION AND SYNCHRONIZED OVULATION

TERMINAL OBJECTIVE

Upon completion of this unit, the student will be able to name advantages and disadvantages of using artificial insemination and synchronized ovulation. He should be able to name symptoms of estrus and demonstrate the procedures for inseminating cattle. This knowledge will be evidenced through demonstration and by scoring 85 percent on the test.

SPECIFIC OBJECTIVES

After completion of the unit, the student will be able to:

1. Define five terms associated with artificial insemination
2. Name five advantages of using artificial insemination
3. Name three disadvantages of using artificial insemination
4. Name two sources of semen for use in artificial insemination
5. Name two indications of estrus and indicate which one is the most important in regard to time of insemination
6. State in writing the normal cycle and period of cows and give the variation in cycle and period
7. Name the time when a cow ovulates and where fertilization occurs
8. List the gestation period of given animals
9. State in writing the appropriate time to inseminate
10. Name four reasons why timing is important when using artificial insemination
11. Select from a list the percentage of pregnancies of first services expected when using artificial insemination
12. Name five factors that contribute to poor conception rates
13. Identify tools necessary for artificial insemination

SPECIFIC OBJECTIVES

14. Identify four errors in inseminating a cow with relationship to the misplacement of the inseminating tube

15. Name four functions of the ovary

16. Name four reasons why cows don't settle

17. Name two functions of the mucus

18. Demonstrate the procedures for inseminating a cow using the polybulb system

19. List five advantages and five disadvantages of synchronized ovulation

20. Sequence the two major steps, the injection(s) and timed insemination for prostaglandins for cows

21. Define and list seven advantages and four disadvantages of embryo transfer

ANIMAL BREEDING

UNIT III

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheets
2. Provide students with Information and Assignment Sheets
3. Make transparencies
4. Discuss Terminal and Specific Objectives
5. Discuss Information Sheets
6. Demonstrate the procedures of inseminating cattle
7. Secure slides and tapes from Curriculum Center to show class
8. Obtain reproductive tracts from slaughterhouse
   (NOTE: Reproductive tracts may be used for Assignment Sheet #1)
9. Field trip or resource personnel
10. Give Test

Students:

1. Read Objective Sheets
2. Study Information Sheets
3. Demonstrate the ability to inseminate cattle
4. Take Test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objective Sheets
2. Information Sheets
3. Transparency Masters

   TM 1 - WHY BREED ARTIFICIALLY?

INSTRUCTIONAL MATERIALS

TM 2 - ANIMAL HEALTH PRECAUTIONS IN ARTIFICIAL INSEMINATION

TM 3 - LIMITATIONS OF ARTIFICIAL INSEMINATION

TM 4 - SANITARY PRECAUTIONS IN ARTIFICIAL INSEMINATION

TM 5 - ARTIFICIAL VAGINA

TM 6 - ELECTRONIC SEMEN COLLECTION EQUIPMENT

TM 7 - SEMEN DILUTERS

TM 8 - INDICATIONS OF ESTRUS

TM 9 - OVARIES DURING ESTRUS

TM10 - TOOLS USED IN INSEMINATING

TM11 - SUPPORTING TOOLS USED IN ARTIFICIAL INSEMINATION

TM12 - SEMEN AMPULING AND STORAGE

TM13 - PALPATION EQUIPMENT

TM14 - HOLDING CHUTE FOR PALPATION & INSEMINATION

TM15 - ERRORS IN PLACING INSEMINATING TUBE

TM16 - DEEP UTERINE INSEMINATION

TM17 - BREEDING CALCULATOR

4. Assignment Sheet

   #1 - Inseminate a Cow

5. Test

6. Answers to Test

References:

1. Hafez, E.S.E., ed. Reproduction in Farm Animals. Philadelphia: Lea and Febiger, 1962.

2. Stamm, G.W. Artificial Breeding and Livestock Improvement. Chicago, Illinois: Windsor Press.

ANIMAL BREEDING

UNIT III

INFORMATION SHEET

I. Terms and Definitions

- A. Artificial insemination - means of obtaining pregnancy without the use of natural service
- B. Inseminating tube - A tube used to place sperm into a female's reproductive tract
- C. Conception - The female and male germ cells' meeting and fertilization occurring without future heat cycles
- D. Pregnancy - The term used to indicate that an animal is carrying a young fetus
- E. Gestation - The length of time from fertilization until birth
- F. Fertilization - A process of the female and male germ cells' meeting
- G. Estrus cycle - The time elapsing from one heat period to the next
- H. Follicle - A grape-like bubble located on the ovary which houses the egg. After ovulation and if fertilization occurs, the follicle produces the pregnancy hormone - progesterone. If pregnancy does not occur, the follicle is reabsorbed by the ovary
- I. Synchronized Ovulation - An attempt to cause a herd of cows' estrus cycles to begin at the same time
- J. Prostaglandins - Ovulation hormone cleared to synchronize ovulation
- K. Superovulation - Releasing multiple ovum or embryo
- L. Embryo Transfer - The moving of an embryo, early in development, from it's mother's reproductive tract and transfering it to a host female reproductive tract for development and birth

II. Advantages of Using Artificial Insemination (See TM 1)

- A. Improvement of herd
- B. Reduction of cost of keeping a bull
- C. Prevention of disease spread
- D. Regulation of calving time

INFORMATION SHEET

- E. Increasing calf uniformity
- F. Wider selection of bulls

III. Disadvantages of Using Artificial Insemination (See TM 3)

- A. Requires skilled inseminator to achieve same conception rate as natural service
- B. Closer supervision of cows required
- C. More equipment needed
- D. Sanitary precautions (See TM 4)

IV. Sources of Semen for Artificial Insemination (See TM 5,6 & 7)

- A. Bull studs
- B. Collecting from own bulls

V. Indication of Estrus (See TM 8)

- A. Standing to be ridden and riding others
- B. Nervousness, restlessness
- C. Clear, sticky mucus flow from vulva
- D. Minor symptoms
  - 1. Bellowing
  - 2. Holding up of milk
- E. Most important symptom - Standing to be ridden

VI. Estrus Cycle and Period of Cows

- A. Frequency every three weeks (average 18 to 24 days)
- B. Duration of heat
  - 1. Standing heat is 16 to 18 hours
  - 2. Varies 6 to 35 hours

VII. Ovulation and Fertilization of Cows

- A. Ovulation occurs 8 to 10 hours after standing heat (See TM 9)

INFORMATION SHEET

B. Fertilization occurs in Fallopian tube

VIII. Gestation Periods

A. Cow: 283 days

B. Mare: 334-340 days

C. Sow: 114 days

D. Ewe: 150 days

IX. Appropriate Time to Inseminate - After Standing Heat

(NOTE: If a cow is noticed in standing heat during the morning, she should be inseminated in the afternoon)

X. Reasons why Timing is Important

A. Cervical reaction of uterine contraction present

B. The need for the male sperm to be in the fallopian tube six hours before ovulation occurs

C. Too early insemination - sperm die

D. Too late - egg gone

XI. Percentage of Pregnancies Expected

A. First service: 65-70%

B. Second service: 70-85%

C. Third service: 85-95%

D. Remaining 5% - problem cows (non-breeders)

XII. Causes of Poor Conception Rates

A. Improper timing

B. Poor inseminating technique

C. Management failure

D. Disease factors

E. Ovulation failures

INFORMATION SHEET

XIII. Tools Used in Inseminating (See TM 11 & 12)

- A. Nitrogen chest
- B. Thaw box
- C. Inseminating tube
- D. Disposable gloves
- E. Polybulbs
- F. French Straw system

(Note: Supporting material following information section)

XIV. Errors in Inseminating (See TM 13 & 14)

- A. Inseminating tube placed in blind cavity of cervix
- B. Inseminating tube placed in prolapsed cervix
- C. Inseminating tube placed in fold of vaginal wall
- D. Inseminating tube placed in urethra opening

XV. Function of Ovary (See TM 15 & 16)

- A. Brings cow in heat
  (Note: This is brought about by the ovary's producing the hormone estrogen)
- B. Moves sperm through the reproductive tract
- C. Produces hormone that takes cow out of heat (progesterone)
- D. Builds nest for embryo

XVI Reasons Cows do not Settle

- A. Ovulation failure
- B. Delayed ovulation
- C. Follicle fails to rupture
- D. Stimulant is not moving sperm

INFORMATION SHEET

XVII. Function of Mucous Material

  A. Serves as a cleansing agent

  B. Serves as a stream for passage of sperm

XVIII. French Straw System (See next page)

XIX. Synchoronized Ovulation

  A. Purpose is to group breeding, calving and marketing of live animals

  B. Hormones

    1. Progesterone

    2. Progestogens

    3. Estrogens

    4. Prostaglandins

  C. Advantages

    1. Reduces time checking estrus in an artificial insemination program, because you try to synchronize a group of animals to exhibit estrua or ovulate during a certain time period

    2. Reduces labor - efforts of labor can be concentrated for a shorter period of time

    3. Makes A.1. more feasible on beef herds and by reducing one set of management problems

    4. Groups offspring for a more uniform calf crop

    5. Improves management practice by grouping the cattle for closer observation

  D. Disadvantages

    1. Some conception rates are low - 40%

    2. Cost per head - estimated at $3.50 per head per shot

    3. Concentrated labor for A.I. and calving periods

    4. Problem of too many cows calving or trying to calve the same 24-36 hours

INFORMATION SHEET

FRENCH STRAW GUN

The "gun" illustrated in Fig. I is the inseminating instrument for the French Straw system.

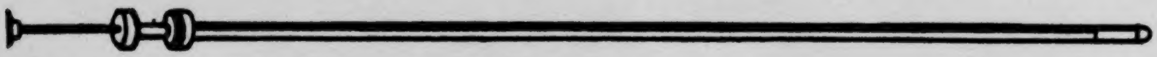
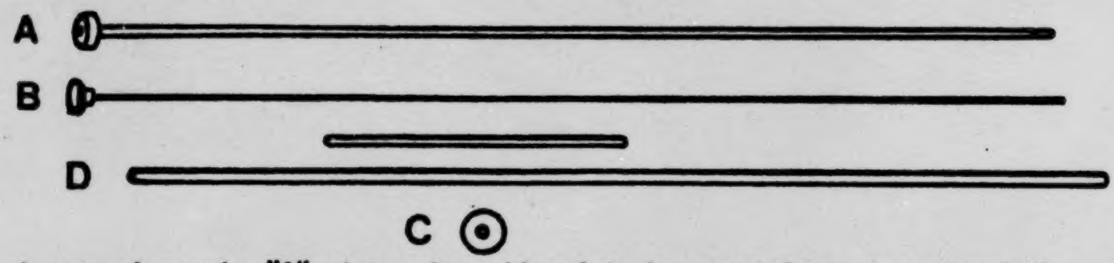


Fig. I

The "gun" itself is made up of three permanent parts - (a) the barrel; (b) the plunger; (c) the "O" ring. In addition, there is a disposable plastic sheath, "D".



A note about the "O" ring. One side of it has an indentation around the center opening. This makes the opening on that side somewhat larger than the opening on the other side. This wider opening should face the discharge end of the gun. The narrow opening is therefore closer to your thumb on the plunger.

To be able to put the straw into the "barrel of the gun" you will, of course, have to withdraw the plunger about four to five inches. (A tip on this - to keep the plunger from falling out, put a slight bend in it so that it fits relatively snug in the barrel. Care must be taken not to bend it too much so that it cannot be pushed back into the barrel, or that it fails to hit the center of the straw when inseminating.)

After thawing, the straw is removed from its ice water bath and thoroughly dried with a paper towel. It is then placed into the barrel of the gun with the air space at the top (Fig.II) and held in an upright position. The exposed sealed end of the straw is then cut off with an ordinary pair of scissors. This cut should be made perfectly square (at a right angle to the straw) and made through the top of the air space, just below the plug (or seal).

The disposable plastic sheath is slipped over the entire gun and tightened securely by sliding the "O" ring down and giving it a slight twist.

Check the tip of the plastic sheath to make certain that the straw is well-placed in the tapered end of the sheath.

Move the plunger slowly forward until the semen is just about to emerge from the tip of the gun.

The gun is then used as a regular inseminating tube when breeding the cow. Because it is more rigid than the plastic tube, it takes some practice to become accustomed to its use. Most technicians, however, have found that it is easier to use than the tube.

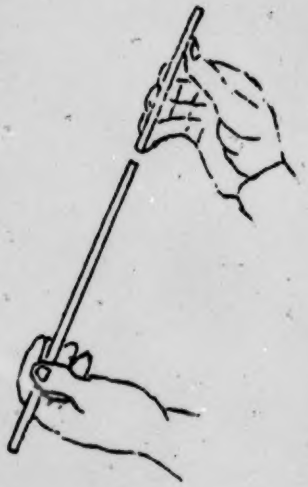


Fig. II

When the site of deposition is reached, the plunger is pushed all the way in. The plug at the bottom end of the straw will force out the semen and the plug itself will be stopped by the constriction at the end of the sheath.

The gun is then withdrawn, the "O" ring loosened by a flip of the thumb and the sheath,along with the straw, removed from the gun and disposed of. The gun should be kept clean and sanitary at all times.

INFORMATION SHEET

5. Handling the cows 3 times - twice for shots, and the third time for A.I.

XX. Sequence for Cows (See TM 17)

A. Prostaglandins

1. Management must select desired calving date

2. Select animals that have calved prior to one complete estrus cycle after the desired calving date, i.e. if you desire calves on March 1, select cows that have calved before April 21-23

3. Two injections required

a. Give 1st injection two estrus cycles or 45 days after desired calving date i.e. for a March 1st calving date, inject on May 7

1. Any corpus luteum present at the 1st injection will be eliminated and progesterone, which is produced by the corpus luteum, will drop sharply which will cause a new estrus cycle to start

2. This 1st injection will have no effect upon the developing corpus luteum before 5 days of age and no effect on the corpus luteum after 16 days of age

b. Give 2nd injection 11 days later i.e. on May 18

1. At the time of the second shot or 11 days after the 1st shot all females should have a corpus luteum present. Therefore, their estrus cycles should be synchronized with ovulation occurring 3 days later

c. Timed insemination 80 hours after second injection i.e. if you give the second injection at 9 am on May 18th, you can breed A.I. at 5 pm on May 21st or 80 hours later

B. Other Species

1. Mares

a. Prostaglandins cleared for market and use on horses

2. Ewe

a. Several synchronizing trials have been conducted

INFORMATION SHEET

        1. Synchromate and prostaglandins give very good response

   3. Sow

      a. Research is continuing

XXI. Superovulation and Embryo Transfer

- A. Bovine or Cow
   - 1. Ovulation
      - a. Presently produces a single or double ovulation
      - b. Therefore, a product must be used to cause multiple embryo or offspring
         - 1. The follicles to grow
         - 2. The follicles to rupture and release the ovum
         - 3. Grouping of superovulation
      - c. Gonadotropins, steroids, and prostaglandins are used for superovulation
   - 2. Cows and embryo transfer
      - a. Definition: The moving of an embryo early in development, from its mother's reproductive tract and transfering it to a host female reproductive tract for development and birth
      - b. Advantages
         - 1. Extends the productivity of producing dams
         - 2. Continue productive life of injured female that is fertile but cannot develop the young
         - 3. Rapid proving of dams through greater number of offspring
         - 4. Shorter generation intervals
         - 5. Transfer embryo from proven stock to grade stock

INFORMATION SHEET

   6. Importation of new breeds and genetics where restricted by law

   7. Induced twinning

c. Disadvantages

   1. Possible propagation of low-fertility animals

   2. To date, prohibitive cost for commercial operator

   3. Possible loss of a valuable dam

   4. Response to hormones is adequate for a herd, but erratic for each individual

d. Embryo collection

   1. Non surgical (flushing) most commonly used

   2. Surgical

INFORMATION SHEET

THE STORAGE AND HANDLING OF FROZEN SEMEN

PACKAGING AND STORAGE

Frozen semen is packaged in a 1/2 cc. plastic straw. Each individual "straw" contains enough semen to inseminate one cow. Positive identification of the bull is printed on the straw. It gives the bull's name, registration number and Curtiss code number. If the label cannot be read for any reason, do not use it.

Five straws are packaged in a plastic tube 4 3/4" long, which, in turn, is clipped to a metal cane. Two such tubes are clipped to a cane resulting in 10 straws (inseminations) per cane. The top of the cane is identified with the Curtiss code number for the bull.

These canes are stored in a metal canister which is suspended inside a liquid nitrogen refrigerator.

TEMPERATURE CONTROL

The first thing to remember about frozen semen is that it must be maintained at very low temperatures. When submerged in liquid nitrogen the temperature is 320 degrees F below zero. The temperature at the bottom of the neck tube of either type containers could vary slightly from this figure, but in any case would be well within safe limits.

Your concern and ours is with the possibility of excessive exposure outside of the liquid nitrogen container. This must always be kept to a minimum. The transfer of semen from one container to another should be done as rapidly as possible and always within less than 10 seconds.

REMOVING THE STRAW

When taking straws from the canister, the canister should only be raised to the upper part of the neck tube and then for no more than 10 seconds. It's quite easy to remove the straw within this amount of time.

As described earlier, the straws are in a small plastic tube clipped to a metal cane. The bull's code number is printed on top of the can for ease and speed of identification.

Raise the canister to the upper level of the neck tube of the refrigerator and locate the cane desired. With a small forceps or tweezers, remove a straw from its tube and put it into an ice water bath. The cane and canister are then eased back into place in the refrigerator.

To prevent unnecessary handling and searching, it is best to always keep only one bull stored on an individual cane. When the upper plastic tube has been emptied of its five straws, remove the tube and set it aside for later return to Curtiss. The second tube is left on the bottom half of the cane until it too has been emptied.

The semen in the straw will thaw in less than one minute in the ice water and as with ampules, best results can be expected when the semen is used as soon as possible after thawing.

WHY BREED ARTIFICIALLY ?

A. MAXIMUM USE OF OUTSTANDING SIRES

B. GREATLY INCREASED UNIFORMITY

C. POSSIBLE TO OVERCOME CERTAIN PHYSICAL HANDICAPS TO MATING

D. LESSENS SIRE COST

E. ALLEVIATES DANGER AND BOTHER OF KEEPING A SIRE

F. REDUCES THE COST AND DELAYS OF USING INFERTILE SIRES

G. BETTER HEALTH PROTECTION

H. IMPROVED HERD RECORDS

I. INCREASES PROFITS

J. INCREASES PRIDE OF OWNERSHIP

Vocational Agriculture Service – College of Agriculture – University of Illinois at Urbana-Champaign (Breeding 30)
From Lesson Plans for Voc. Agr. Instructors, Texas A & M University

ANIMAL HEALTH PRECAUTIONS IN ARTIFICIAL INSEMINATION

1. DON'T BREED BACK TOO SOON

2. AVOID BREEDING DISEASED FEMALES

3. HAVE MALES INSPECTED AT REGULAR INTERVALS

4. HAVE FEMALES INSPECTED THAT HAVE NOT CONCEIVED AFTER THREE BREEDINGS

5. KEEP RECORDS OF HEAT PERIODS AND NOTE IRREGULARITIES

Vocational Agriculture Service – College of Agriculture – University of Illinois at Urbana-Champaign (Breeding 39)
From Lesson Plans for Voc. Agr. Instructors, Texas A & M University

31

LIMITATIONS OF ARTIFICIAL INSEMINATION

A. REQUIRE SKILLED TECHNICIAN

B. MUST CONFORM TO PHYSIOLOGICAL PRINCIPLES

C. MAY RESTRICT THE SIRE MARKET

D. MAY INCREASE THE SPREAD OF DISEASE

E. MAY BE SUBJECT TO CERTAIN ABUSES

F. MAY ACCENTUATE THE DAMAGE OF A POOR SIRE

G. CONSIDERABLE CAPITAL AND COMPETENT MANAGERIAL ABILITY ARE NECESSARY TO INITIATE AND OPERATE AN ARTIFICIAL BREEDING ORGANIZATION

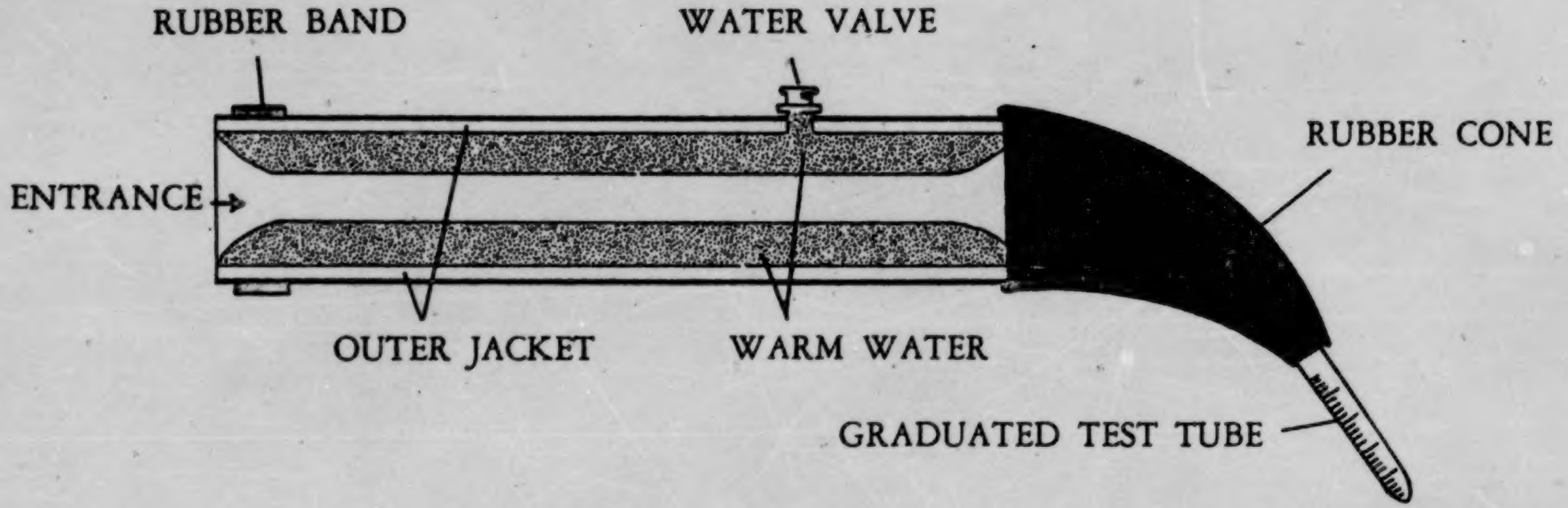
From Lesson Plans for Voc. Agr. Instructors, Texas A & M University

SANITARY PRECAUTIONS IN ARTIFICIAL INSEMINATION

1. STERILIZE ALL SEMEN COLLECTION EQUIPMENT
2. CLEAN AND STERILIZE ALL GLASSWARE FOR SEMEN HANDLING
3. FOLLOW STRICT REFRIGERATION REGULATIONS FOR HANDLING SEMEN
4. COMPLETELY STERILIZE ALL INSEMINATION EQUIPMENT
5. MAKE PROPER DISPOSAL OF ALL DISPOSABLE EQUIPMENT

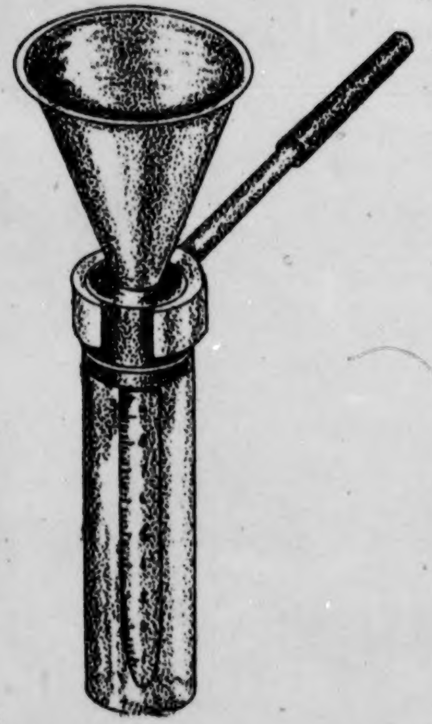
Vocational Agriculture Service – College of Agriculture – University of Illinois at Urbana-Champaign (Breeding 40)
From Lesson Plans for Voc. Agr. Instructors, Texas A & M University

ARTIFICIAL VAGINA

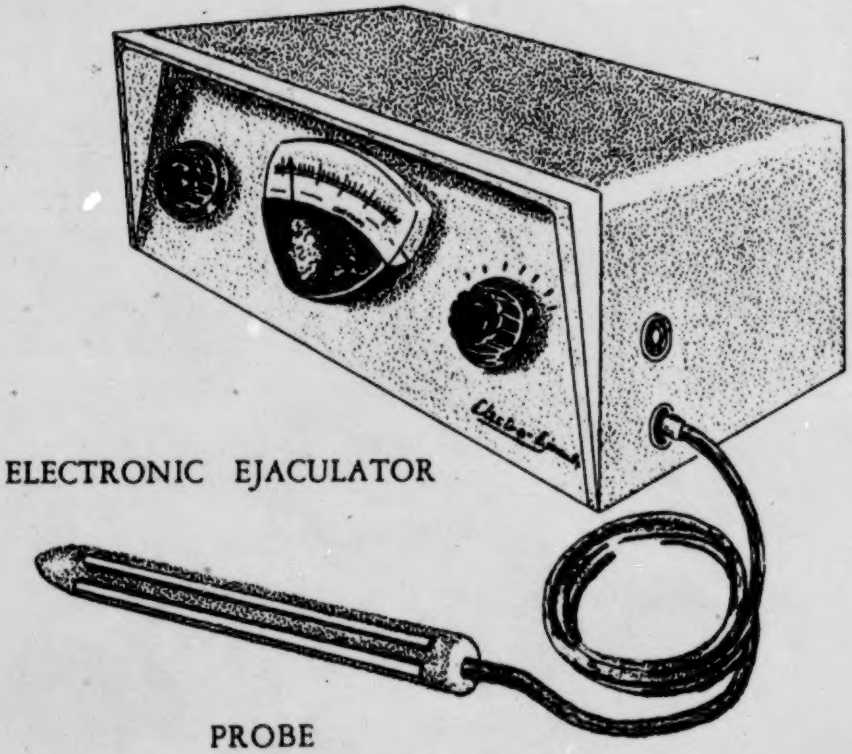


Vocational Agriculture Service – College of Agriculture – University of Illinois at Urbana-Champaign (Breeding 32)
From Lesson Plans for Voc. Agr. Instructors, Texas A & M University

ELECTRONIC SEMEN COLLECTION EQUIPMENT



COLLECTION HANDLE
AND VIAL



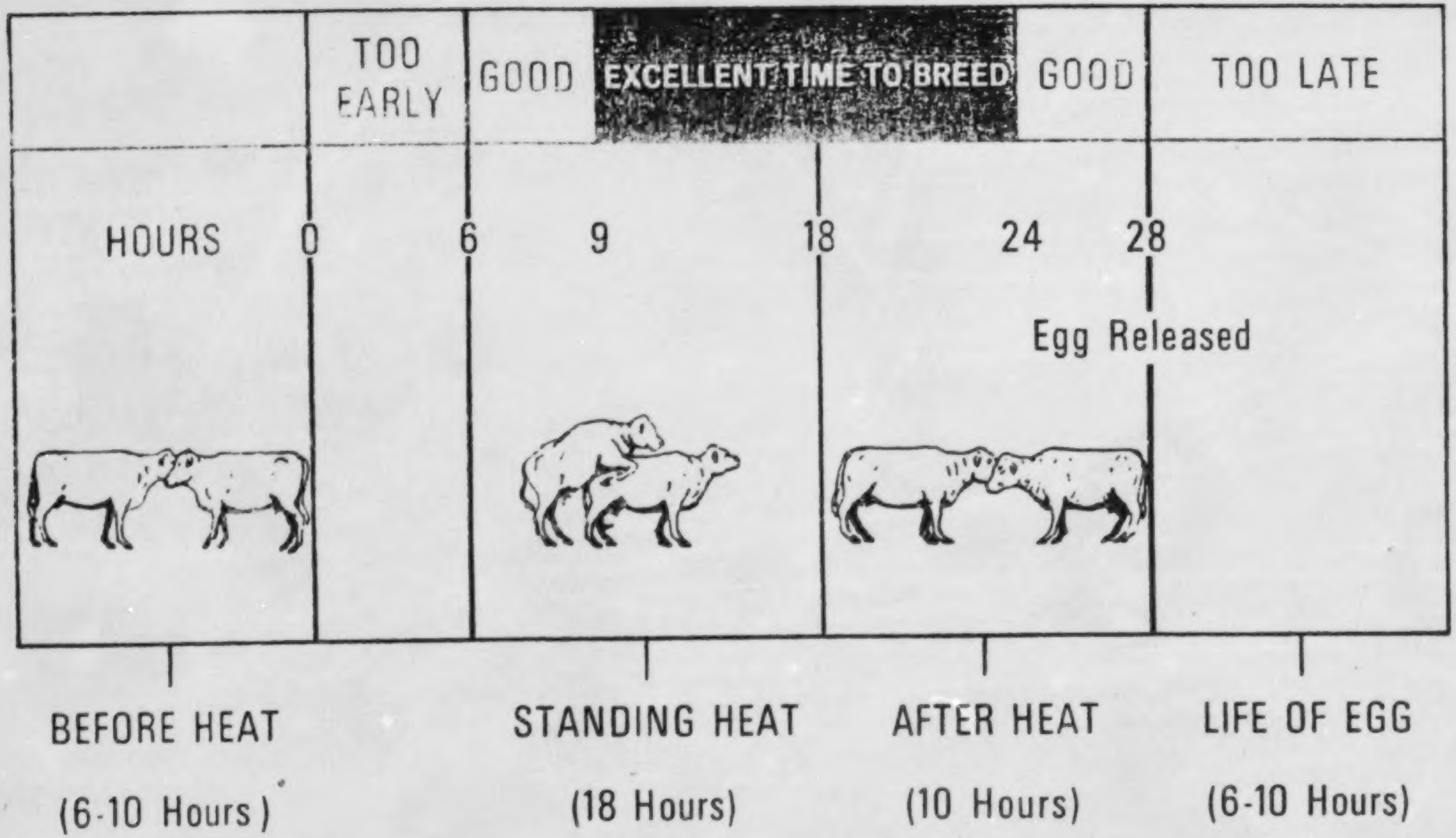
Vocational Agriculture Service — College of Agriculture — University of Illinois at Urbana-Champaign (Breeding 33)
From Lesson Plans for Voc. Agr. Instructors, Texas A & M University

SEMEN DILUTERS

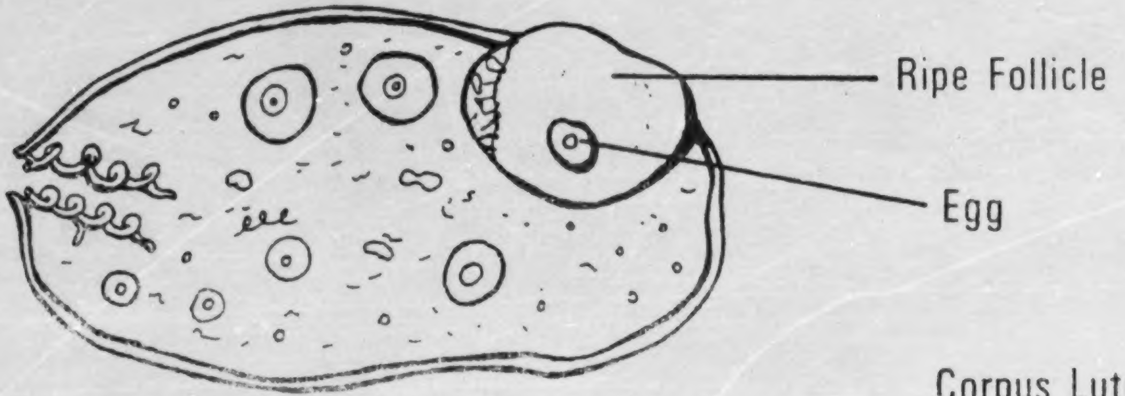
Type of Diluter	Classes of Animals Used For	Comments
1. egg yolk-citrate	bull,ram	1 part fresh egg yolk to 3 parts 2.9% sodium citrate dihydrate in distilled water.
2. egg yolk-phosphate	bull ,ram,stallion	mix equal parts of fresh egg yolk and chemically pure sodium hydrophosphate-hydrate or (appropriate phosphate solution)
3. homogenized whole milk	bull, ram,boar	boil fresh homogenized whole milk for 5 to 10 minutes. then cool to body temperature and dilute with equal parts of distilled water.
4. glycine-containing diluents	boar	formula-50% of a 4% glycine solution, 42.5% skim milk, and 7.5% egg yolk

Vocational Agriculture Service – College of Agriculture – University of Illinois at Urbana-Champaign (Breeding 34)
From Lesson Plans for Voc. Agr. Instructors, Texas A & M University

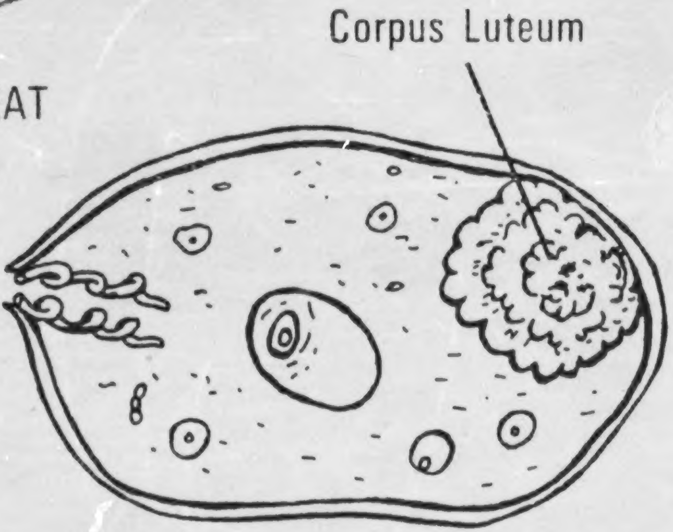
Indications of Estrus



Ovaries During Estrus



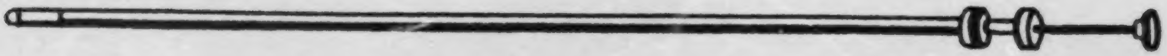
OVARY OF COW DURING HEAT



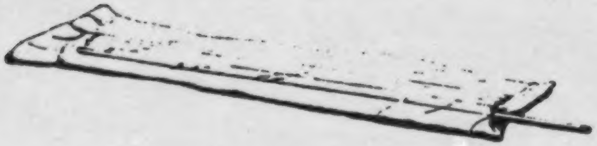
OVARY OF COW NOT IN HEAT

Tools Used in Inseminating

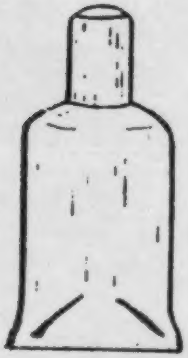
French Straw Gun



Inseminating Tubes

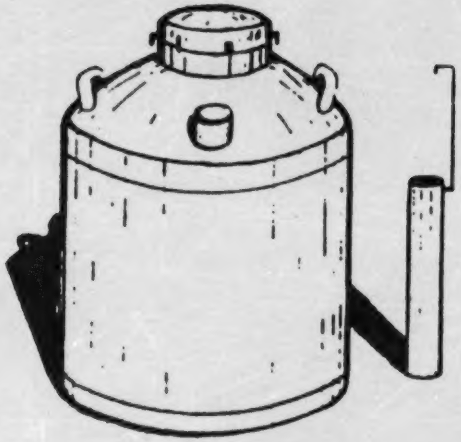


Polybulb

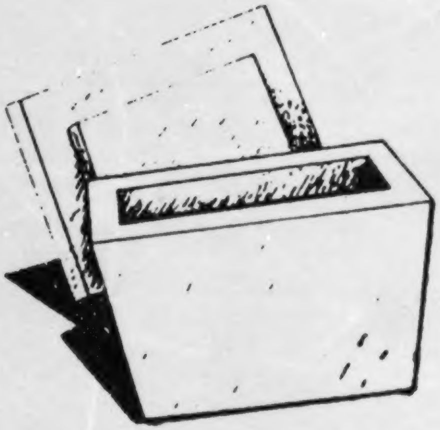


TM 4-7 10

SUPPORTING TOOLS USED IN ARTIFICIAL INSEMINATION



Nitrogen Chest



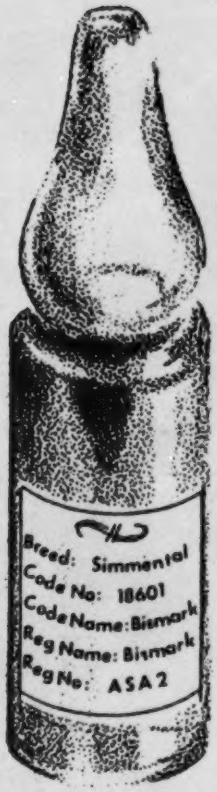
Thaw Box

Disposable Gloves

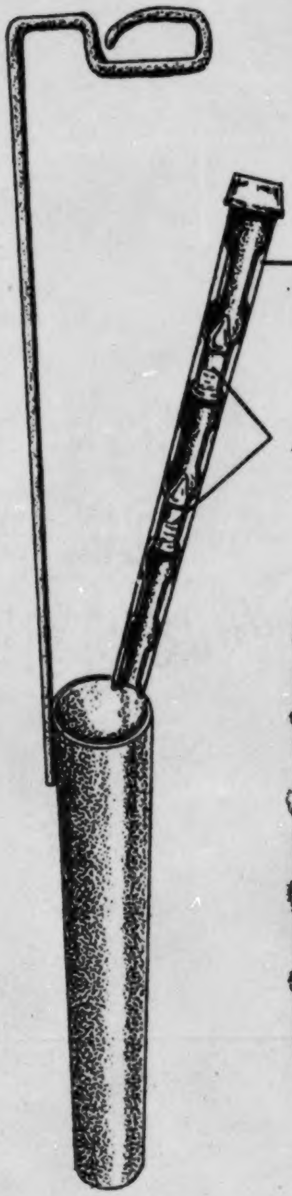
TM 4 -

AR. III - 43-B

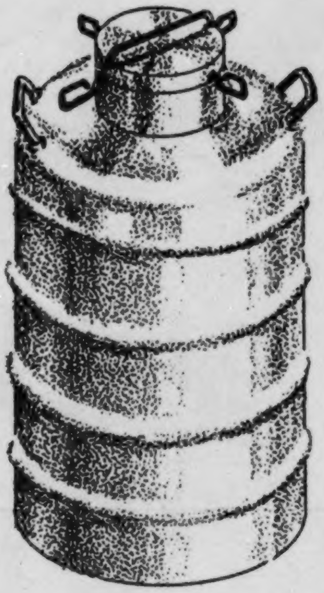
SEMEN AMPULING AND STORAGE



SEMEN AMPULE



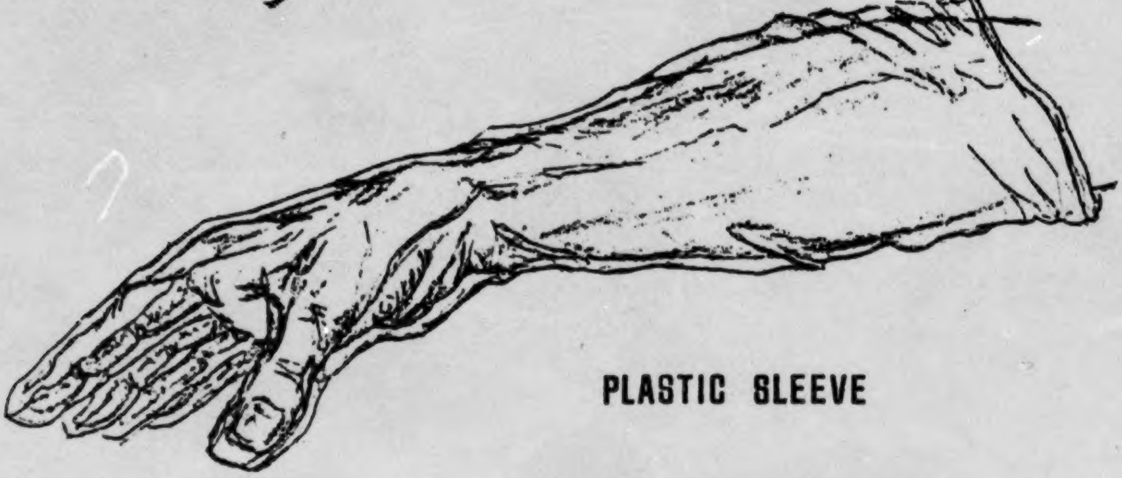
CANISTER



LIQUID NITROGEN
STORAGE CONTAINER

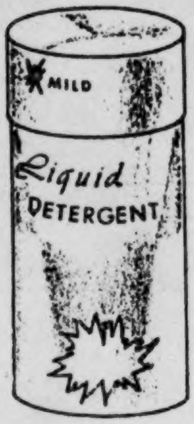
PALPATION EQUIPMENT

RUBBER SLEEVE



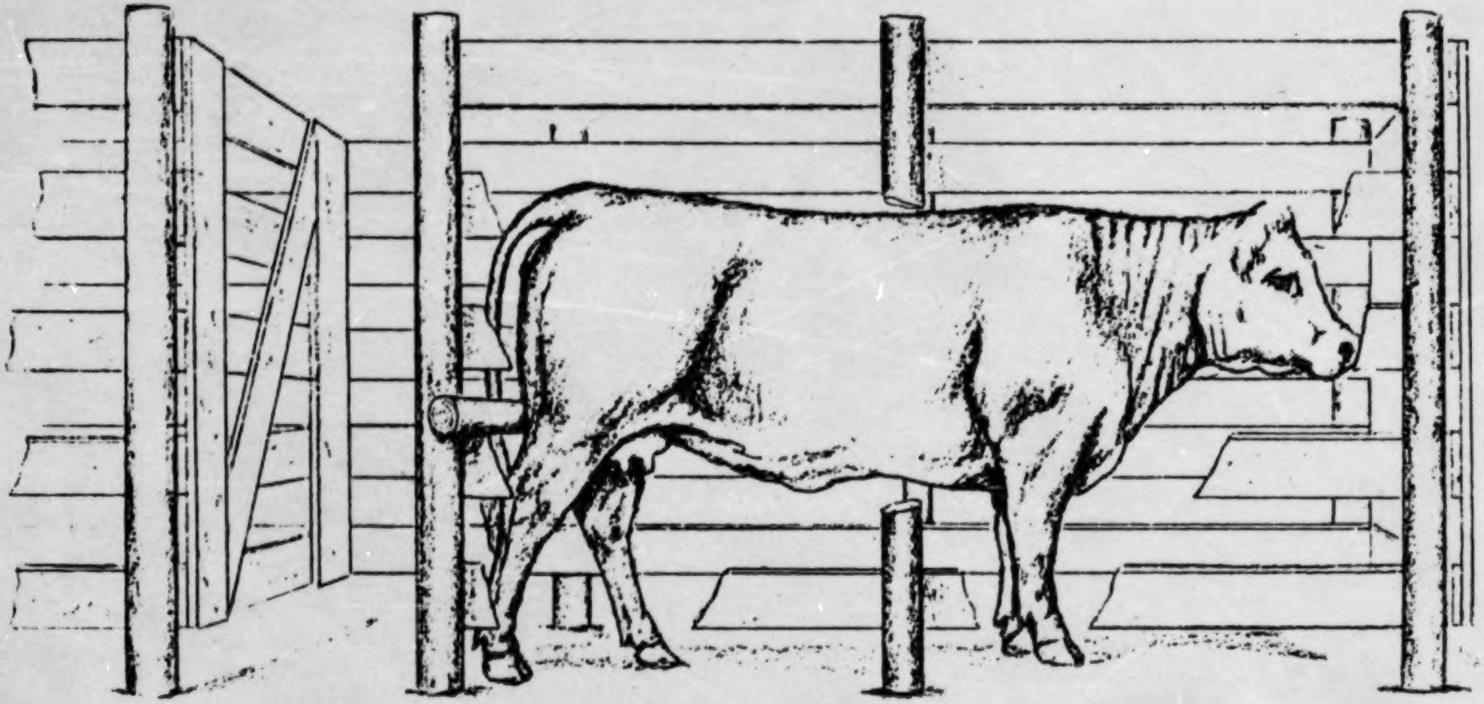
PLASTIC SLEEVE

LUBRICANT



Vocational Agriculture Service – College of Agriculture – University of Illinois at Urbana-Champaign (Breeding 41)
From Lesson Plans for Voc. Agr. Instructors, Texas A & M University

HOLDING CHUTE for PALPATION & INSEMINATION



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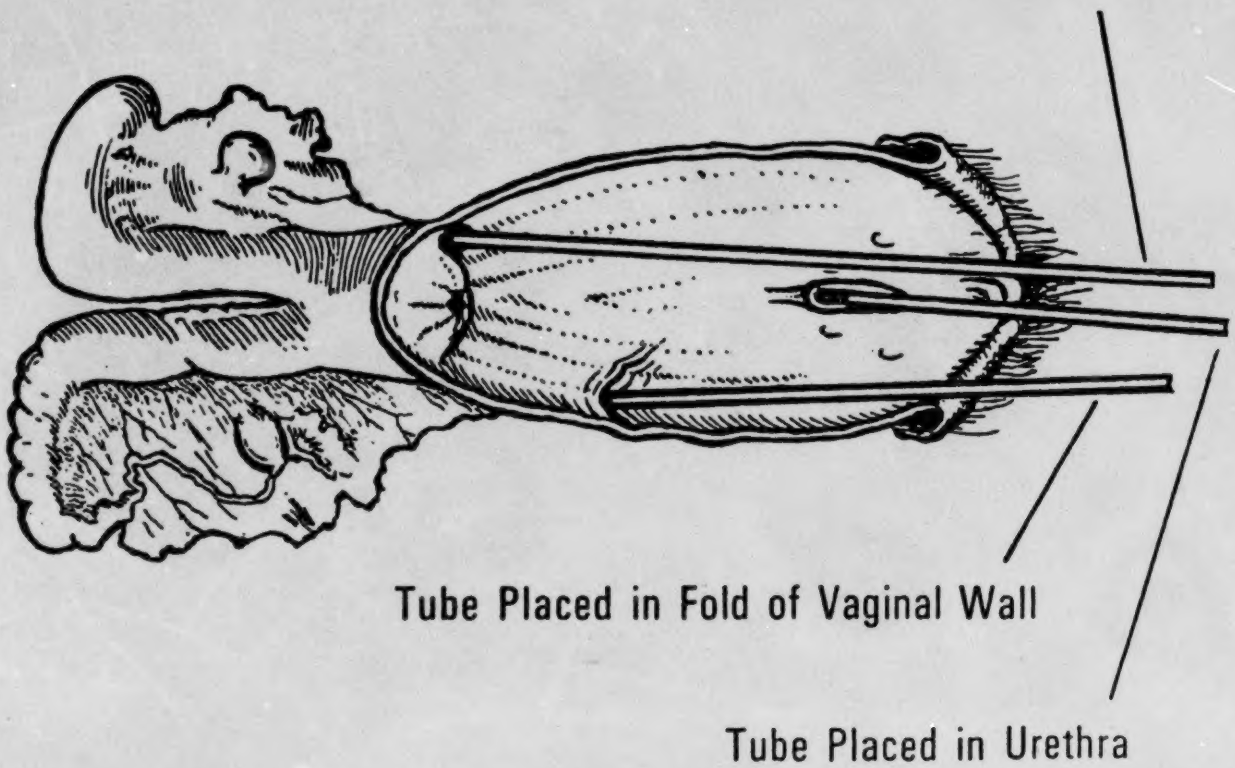
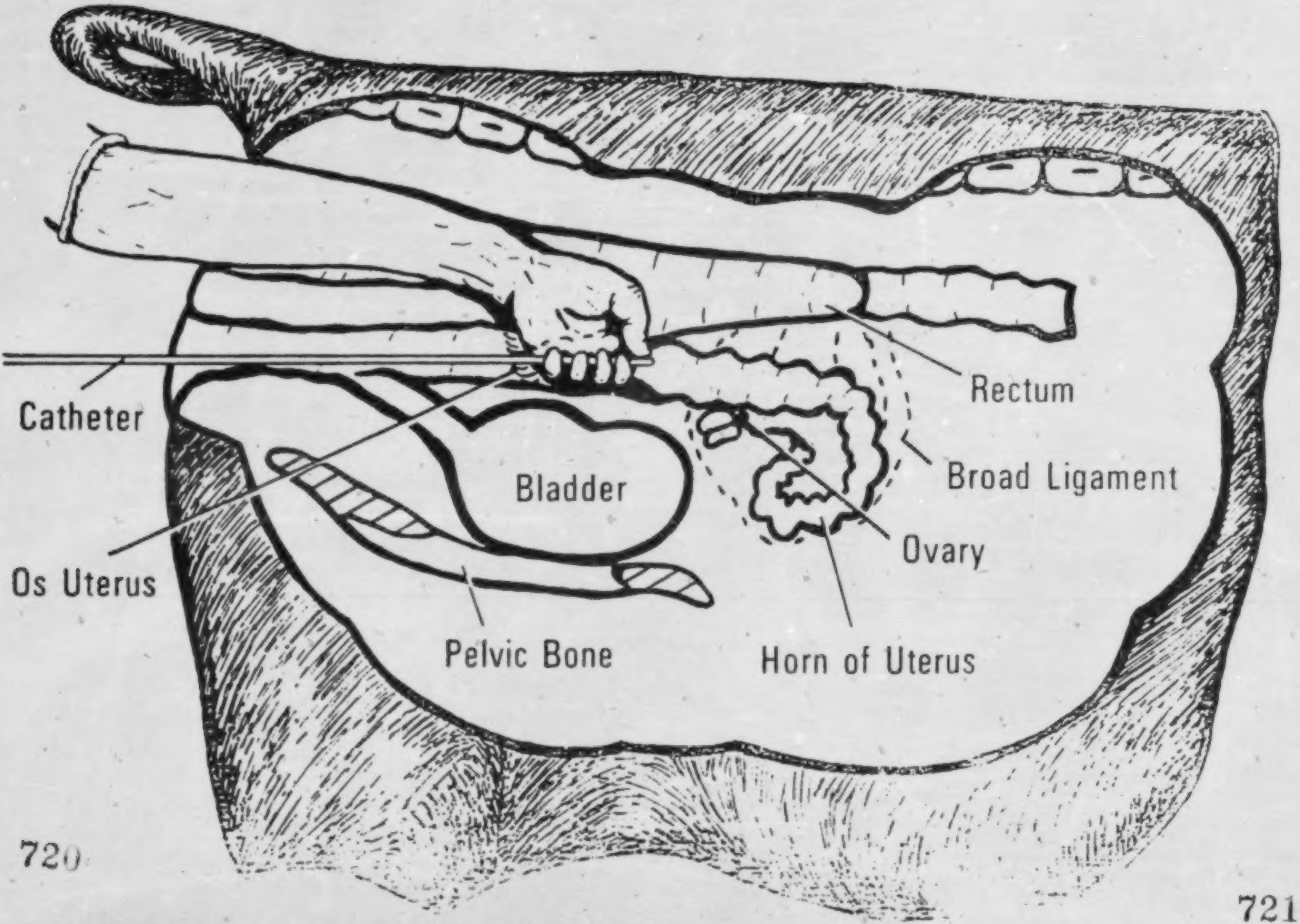
From Lesson Plans for Voc. Agr. Instructors, Texas A & M University

Errors in Placing Inseminating Tube


Tube Placed in Blind Cavity of Cervix
Tube Placed in Fold of Vaginal Wall
Tube Placed in Urethra

Ag. III - 44-B

Deep Uterine Insemination



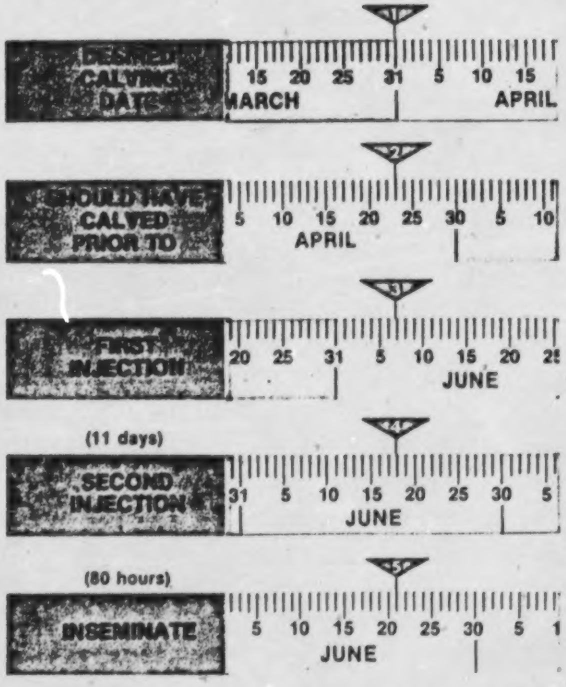
Ag. III - 45-R

TM 9

Upjohn

Lutalyse®
(dinoprost tromethamine)

BREEDING CALCULATOR



INSTRUCTIONS:
Move slide only once.

Preplanning
- Set 1st arrow at desired calving date.
- Select animals according to previous calving dat (2nd arrow).

Injection Program
- Read date of 1st injection at 3rd arrow.
- Read date of 2nd injection at 4th arrow. Choose time for 2nd injection on chart below.
- Inseminate on date shown by 5th arrow at time directly below time of 2nd injection on chart.

On leap year, add one day for Feb. 29.

See Other Side for July–Dec.

TIME OF SECOND INJECTION								
4 a.m.	5	6	7	8	9	10	11	Noon
↓	↓	↓	↓	↓	↓	↓	↓	↓
Noon	1	2	3	4	5	6	7	8 p.m.
TIME TO INSEMINATE								

See package insert for complete product information.

V-2612

ANIMAL BREEDING

UNIT III

ASSIGNMENT SHEET #1: Inseminate a Cow

I. Tools and equipment

   A. Inseminating tube

   B. Polybulb or syringe

   C. Plastic glove

   D. Thaw box

   E. Lubricant

II. Materials

   A. Nitrogen chest

   B. Ampule of semen

III. Procedures

   A. Place cow in chute

   B. Remove semen from nitrogen chest

   (NOTE: See supporting material proceeding this Job Sheet)

   C. Place semen in thaw box

   (NOTE: Frozen semen must be thawed in ice water for ten minutes before used in insemination.)

   D. Place plastic glove on left arm

   E. Place polybulb on end of inseminating tube

   F. Open ampule of semen, depress polybulb, and draw semen into tube

   G. With tube in a horizontal position, place in mouth

   (NOTE: Reason for placing tube in mouth is for holding so both hands will be free.)

   H. Lubricate glove

   (NOTE: Ky-jelly is the best lubricant to use, but mild soap and water will serve the purpose.)

   I. Insert left hand into rectum for removal of feces

   J. Clean exterior of the vulva with paper towel

K. With left hand in rectum, locate cervix and hold in palm of hand

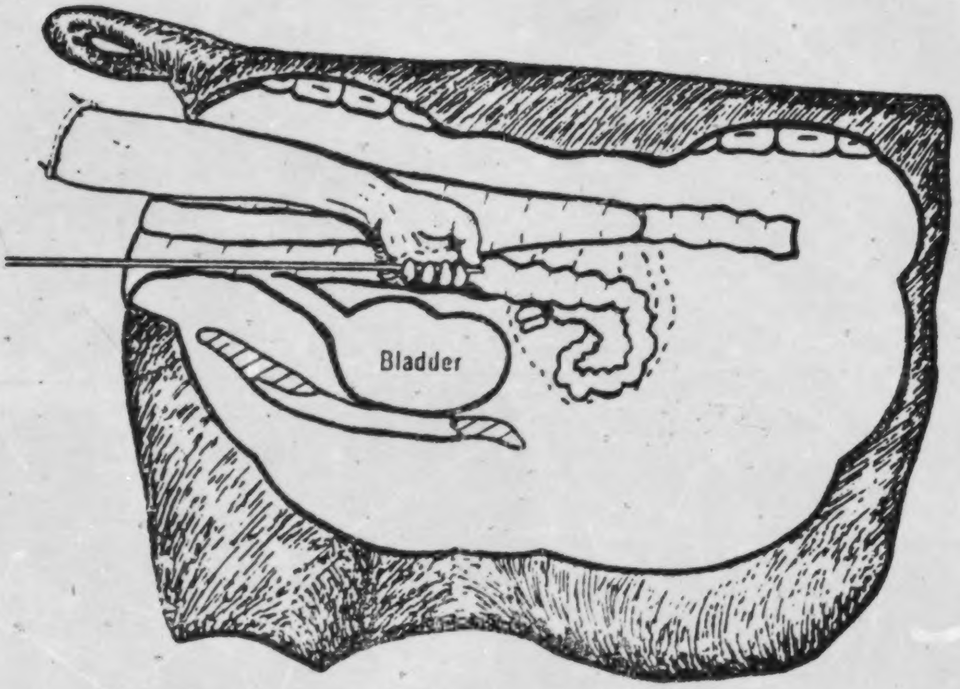
L. With right hand, insert tube into the vulva; guide tube through the cervix

M. Deposit semen at the end of the cervix by pressing the polybulb between the thumb and finger of the right hand

N. Remove tube from vagina and hand from rectum

(NOTE: On removal of hand from rectum, with glove hand locate and squeeze clitoris between thumb and finger.)

IV. Diagram of procedure



ANIMAL BREEDING

UNIT III

TEST

1. Define the following terms

    a. Gestation

    b. Fertilization

    c. Artificial insemination

    d. Conception

    e. Inseminating tube

    f. Synchronized ovulation

    g. Embryo transfer

2. Name five advantages of using artificial insemination

    a.

    b.

    c.

    d.

    e.

3. Name three disadvantages of using artificial insemination

    a.

    b.

    c.

4. Name two sources of semen for use in artificial insemination

    a.

    b.

5. Name two indications of estrus

    a.

    b.

TEST

6. Of the different indications of estrus, which one is the most important in regard to the time to inseminate?

7. What is considered to be a normal estrus cycle in cattle?

8. What time during estrus does a cow ovulate?

9. Where does fertilization occur in cattle?

10. What is the gestation period in days of the following animals?

    a. Sow

    b. Mare

    c. Ewe

    d. Cow

11. Circle the correct percentages below indicating number of first services expected when using artificial insemination

    a. 85-95%

    b. 70-85%

    c. 50-60%

    d. 65-70%

12. When would be the appropriate time to inseminate a cow during estrus?

13. Name four reasons why timing is important when using artificial insemination.

    a.

    b.

    c.

    d.

14. What are five factors that contribute to poor conception rates?

    a.

    b.

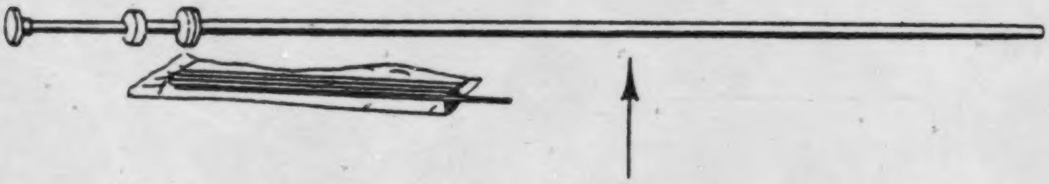
    c.

    d.

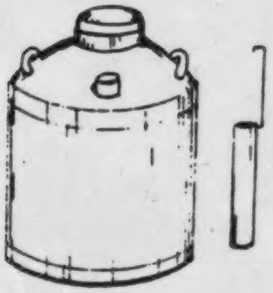
    e.

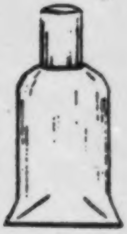
TEST

15. Identify the following insemination tools.



a. ____________________ b. ____________________





c. ____________________ d. ____________________

16. Name four functions of the ovary?

a.

b.

c.

d.

17. Name four reasons why cows do not settle.

a.

b.

c.

d.

18. Name two functions of the mucus material that is discharged from the female reproductive tract.

a.

b.

TEST

19. List four advantages of synchronized ovulation.

    a.

    b.

    c.

    d.

20. Chart the sequence for prostaglandins injections for timed insemination.

21. List four advantages of embryo transfer.

    a.

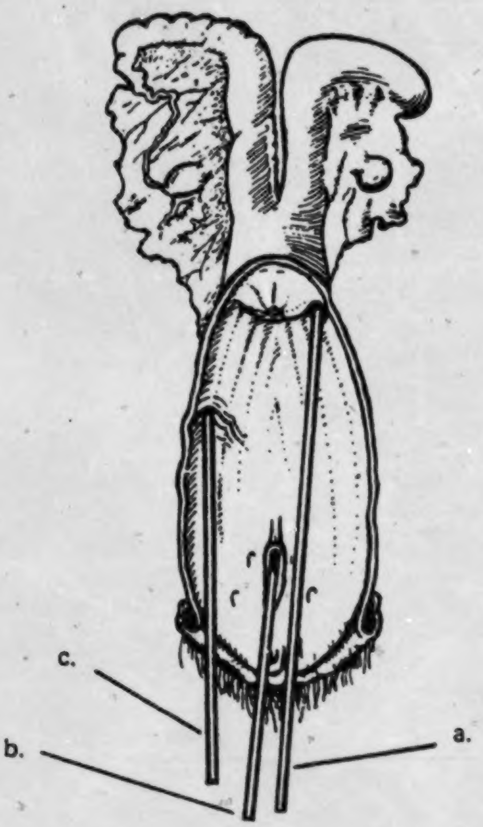
    b.

    c.

    d.

TEST

22. From the drawing below identify the location of the inseminating tube which results in poor conception rates.



a.______________________ b.______________________

c.______________________

23. Demonstrate the procedures for inseminating a cow.

ANIMAL BREEDING

UNIT III

ANSWERS TO TEST

1. a. Gestation - The length of time from fertilization until birth.
   b. Fertilization - A process of the female and male germ cells' meeting.
   c. Artificial insemination - A means of obtaining pregnancy without the use of natural service
   d. Conception - The female and male germ cells' meeting and fertilization occurring without future heat cycles
   e. Inseminating tube - A tube used to place semen into a female's reproductive tract
   f. Synchronized Ovulation - An attempt to cause a herd of cow's estrus cycle to begin at the same time
   g. Embryo transfer - Transferring one embryo from its mother to host cow

2. Any five of the following:
   a. Improvement of herd
   b. Reduction in cost of keeping a bull
   c. Prevention of disease spread
   d. Regulation of calving time
   e. Increasing calf uniformity
   f. Wider selection of bulls

3. a. Lower conception rate than natural service
   b. Closer supervision of cows required
   c. More equipment needed

4. a. Bull studs
   b. Collecting from own bulls

5. Any two of the following:
   a. Stands to be ridden and rides others
   b. Nervousness, restlessness
   c. Clear, sticky mucus flowing from vulva
   d. Bellowing, holding up of milk

ANSWERS TO TEST

6. Standing to be ridden

7. Three weeks (average 18 to 24 days)

8. 8 to 10 hours after standing heat

9. Fallopian tube

10. a. Sow: 114 days
    b. Mare: 334-340 days
    c. Ewe: 150 days
    d. Cow: 283 days

11. d.

12. After standing heat; if a cow is noticed in heat during early morning, inseminate in the afternoon

13. a. Cervical reaction or uterine contraction present
    b. The need for the male sperm to be in the fallopian tube six hours before ovulation occurs
    c. Too early insemination - sperm die
    d. Too late - egg gone

14. a. Improper timing
    b. Poor inseminating technique
    c. Management failure
    d. Disease factors
    e. Ovulation failure

15. a. Inseminating tube
    b. French straw gun
    c. Nitrogen chest
    d. Polybulb

16. a. Brings cow in heat
    b. Moves sperm through reproductive tract
    c. Produces hormone that takes cow out of heat

ANSWERS TO TEST

d. Builds nest for embryo

17. a. Ovulation failure
    b. Delayed ovulation
    c. Follicle fails to rupture
    d. Stimulant is not moving sperm

18. a. Serves as a cleansing agent
    b. Serves as a stream for passage of sperm

19. Any four of the following:
    a. Reduces time checking estrus
    b. Reduces labor
    c. Makes A.I. more feasible
    d. Groups offspring
    e. Improves management practice by grouping the cattle for closer observation

20. a. Select desired calving date
    b. Select animals that have calved prior to one complete estrus cycle after the desired calving date
    c. Give 1st shot two estrus cycles or 45 days after desired calving date
    d. Give 2nd shot 11 days later
    e. Timed insemination 80 hours after second shot

21. Any four of the following:
    a. Extends productivity of dam
    b. Continue productive life of injured female
    c. Rapid proving of dams
    d. Shorter generation interval
    e. Transfer embryo from proven stock to grade stock
    f. Importation of new breeds and genetics
    g. Induced twinning

ANSWERS TO TEST

22. a. Blind cavity of cervix
    b. Urethra opening
    c. Fold in vaginal wall

23. Performance skills will be evaluated by the instructor

ANIMAL BREEDING

UNIT IV

FERTILITY, PREGNANCY TESTING, AND GESTATION

TERMINAL OBJECTIVE

Upon completion of this unit, the student will be able to recognize the advantages of fertility and pregnancy testing cattle and apply them to his farming or ranching operations. He should be able to demonstrate the ability to pregnancy test his own cows. This knowledge will be evidenced through demonstration and by scoring 85 percent on the post test.

SPECIFIC OBJECTIVES

After completion of this unit, the student will be able to:

1. Define terms associated with fertility and pregnancy testing
2. Name five advantages of pregnancy testing cows
3. Name five advantages of fertility testing bulls
4. Identify the parts of the female reproductive tract illustrating the position within the cow's body
5. Name the five distinct indications of pregnancy while using the rectal examination
6. Identify the stages of pregnancy when given a reproductive tract or an artist's drawing showing the stages
7. Indicate in writing the most difficult stage of pregnancy to detect when using the rectal examination
8. Discuss in a short paragraph why the left hand and arm should be used in rectal examination of pregnancy
9. Name six causes of sterility and delayed breeding in bulls
10. Name and discuss the three grades of semen
11. Name the three periods during the year that represent the most practical time for checking bulls for sterility
12. Define gestation and list the range of gestation by species
13. List and chart the gestation hormones by species
14. Demonstrate the ability to detect pregnancy in cattle by using the rectal examination

ANIMAL BREEDING

UNIT IV

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheet
2. Provide students with Information Sheets
3. Make transparencies
4. Discuss Terminal and Specific Objectives with students
5. Discuss Information Sheets with students
6. Demonstrate and discuss procedures outlined in Assignment Sheet(s)
7. Take field trip to allow students an opportunity to see bulls being fertility tested
8. Secure pregnant reproductive tracts from slaughterhouse showing the different stages of pregnancy
9. Give Test

Students:

1. Read Objective Sheet
2. Study Information Sheets
3. Demonstrate the ability to accomplish the procedures outlined on the Assignment Sheet(s)
4. Participate in field trip
5. Take Test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objective Sheet
2. Information Sheets
3. Transparency Masters

   TM 1 - PARTS OF REPRODUCTIVE TRACT POSITIONED WITHIN COW'S BODY

INSTRUCTIONAL MATERIALS

TM 2 - FEMALE REPRODUCTIVE TRACT

TM 3 - THE RELATIONSHIP OF THE REPRODUCTIVE TRACT TO THE PELVIS

TM 4 - POSITION OF THE HAND IN PALPATION

TM 5 - STAGES OF PREGNANCY

TM 6 - 30 DAY PREGNANCY

TM 7 - 45 DAY PREGNANCY

TM 8 - 60 DAY PREGNANCY

TM 9 - 90 DAY PREGNANCY

TM10 - 120 DAY PREGNANCY

TM11 - 150 DAY PREGNANCY

TM12 - 180 DAY PREGNANCY

TM13 - 210 DAYS TO PARTURITION

TM14 - NORMAL POSITION OF FETUS

TM15 - TEMPERATURE HEAT PERIOD GESTATION

TM16 - SWINE GESTATION TABLE

TM17 - AN INSIDE LOOK AT THE STAGES OF DEVELOPMENT OF A LITTER OF PIGS

4. Assignment Sheet

   #1 - Pregnancy Test Cows

5. Test

6. Answers to Test

References:

1. Ensminger, M.E. Beef Cattle Science. Danville, Illinois: The Interstate Printers and Publishers, Inc.

2. Hafez, E.S. Reproduction in Farm Animals. Philadelphia, Pennsylvania: Lea and Febiger Publishers, Inc.

3. Fertility and Sterility by Hoard's Dairyman. Fort Atkinson, Wisconsin.

ANIMAL BREEDING

UNIT IV

INFORMATION SHEET

I. Terms and Definitions

  A. Sterility - A temporary or permanent reproduction failure

  B. Conception - The female and male germ cells' meeting and fertility occuring without future heat cycles

  C. Estrus cycles - The time elapsing from one heat period to the next

  D. Hermaphrodite - An individual whose genital organs have the characteristics of both male and female

  E. Cryptorchidism - The condition when one or both testicles of a bull have not descended to the scrotum

  F. Bull testing - A method for evaluating the breeding soundness of bulls; actually it is a method for detecting infertility

  G. Pregnancy - The term used to indicate that an animal is carrying a young fetus

II. Advantages of Pregnancy Testing

  A. Cuts winter feed bills

  B. Identifies pregnant cows

  C. A means of culling cows from herd

  D. Slaughter cows will bring a higher return if known to be open

  E. Purebred animals will bring more money if known to be safely in calf

  F. Increases profit

III. Advantages of Fertility Testing

  A. Prevents loss of calf crop

  B. Increases calf crop

  C. Means of selecting bulls

  D. Means of culling bulls from herd

  E. Shortens calving season

  F. Increases profit

INFORMATION SHEET

IV. Parts of Reproductive Tract-Positioned within a Cow's Body (See TM 1)

  A. Rectum

  B. Bladder

  C. Body cavity

  D. Uterus

  E. Cervix

  F. Vagina

  G. Cotyledons (See TM 2)

  H. Pelvic girdle (See TM 3)

  I. Brim of pelvic

  J. Fetus

  K. Vulva

V. Indications of Pregnancy

  A. Palpation of fetus (See TM 4)

  B. Presence of fluid in uterine horn

  (NOTE: The uterine horn changes in shape and size during different stages of pregnancy)

  C. Presence and size of cotyledons

  D. Diameter and pulse rate of uterine artery

  E. Location of uterus to the relationship of pelvic floor

VI. Stages of Pregnancy (See TM 5)

  A. 30 to 40 days - Fetus is thumb size (See TM 6,7,8)

  B. 80 to 100 days - Fetus is positioned on pelvic floor; the uterine horn is usually the size of a boxing glove (See TM 9)

  C. 120 to 150 days - Legs of fetus are distinguishable and less fluid is present in the uterine horn. (See TM 10 and 11)

  (NOTE: The uterine horn membrane seems to be thicker at this stage)

INFORMATION SHEET

D. 160 - 180 days - Hardest month to detect because the calf is pulled over the pelvic girdle and positioned on the floor of the body cavity (See TM 12)

E. 210 - 240 days - Easy time to detect; calf is positioning itself for calving (See TM13)

F. Estimating pregnancy stage square month of gestation ÷ 2

Example: Cow been bred 4 months

4 x 4 = 16 ÷ 2 = 8 (Fetus should be eight inches long)

VII. Rectal examination of Pregnancy most difficult - During the 160 to 180 days of pregnancy because the calf is pulled over the brim of the pelvic girdle

VIII. Use Left Hand and Arm

A. Most pregnancies occur on right side

B. Position of body

(NOTE: When rectally examining a cow, the body is positioned in such a manner that the arm has a tendency to move to the right side of the cow)

IX. Causes of Sterility and Delayed Breeding

A. Poor semen

B. Physical defects and injuries

C. Psychological

D. Infection and diseases

E. Poor management and feeding

F. Inherited abnormalities

X. Grades of Semen

A. Satisfactory - Semen that has a good density indicated by a milky white ejaculate

B. Questionable - Semen that has a single or combination of low values for density, mobility, and rate of movement

INFORMATION SHEET

XI. Practical Periods for Checking Bulls for Sterility

- A. Just before breeding season
- B. Soon after the breeding season
- C. Three to five months after the breeding season

XII. Gestation Period (See TM 14)

- A. Definition
  - 1. To bear
  - 2. That time involved in developing the young from conception until birth
- B. Species (See TM 15,16)
  - 1. Cow - 283 days average with shorter periods, especially for smaller dairy breeds and longer periods for larger breeds
  - 2. Sheep - 147-150 days
  - 3. Swine - 113 days (See TM17)
  - 4. Mares - 336 days
  - 5. Dog - 60 days

XIII. Gestation Hormones by Species

- A. Cows - The production of progesterone by the corpus luteum maintains a quiet condition in the uterus
  - 1. The corpus luteum produces a high level of progesterone increasing from conception until around 250 days of gestation when it starts to decline
  - 2. Drops just before parturition
  - 3. When the progesterone decreases around the 250th day, estrogen increases rapidly and peaks just before birth. Then drops straight down to almost zero at birth
- B. Ewe - Very similar to the cow, however with a lag in estrogen increase until 7 days before parturition. The estrogen increases with a sudden burst then a straight down fall at parturition

INFORMATION SHEET

C. Sow

1. When graphed has a handle bar effect with high levels of progesterone only briefly at the beginning with gradual decline until 2 days before birth, then a sudden dive

2. The other "handle" of the handle bar is estrogen with a gradual increase until a rapid rise starting about 100 days in gestation, then dives at parturition

D. Mare

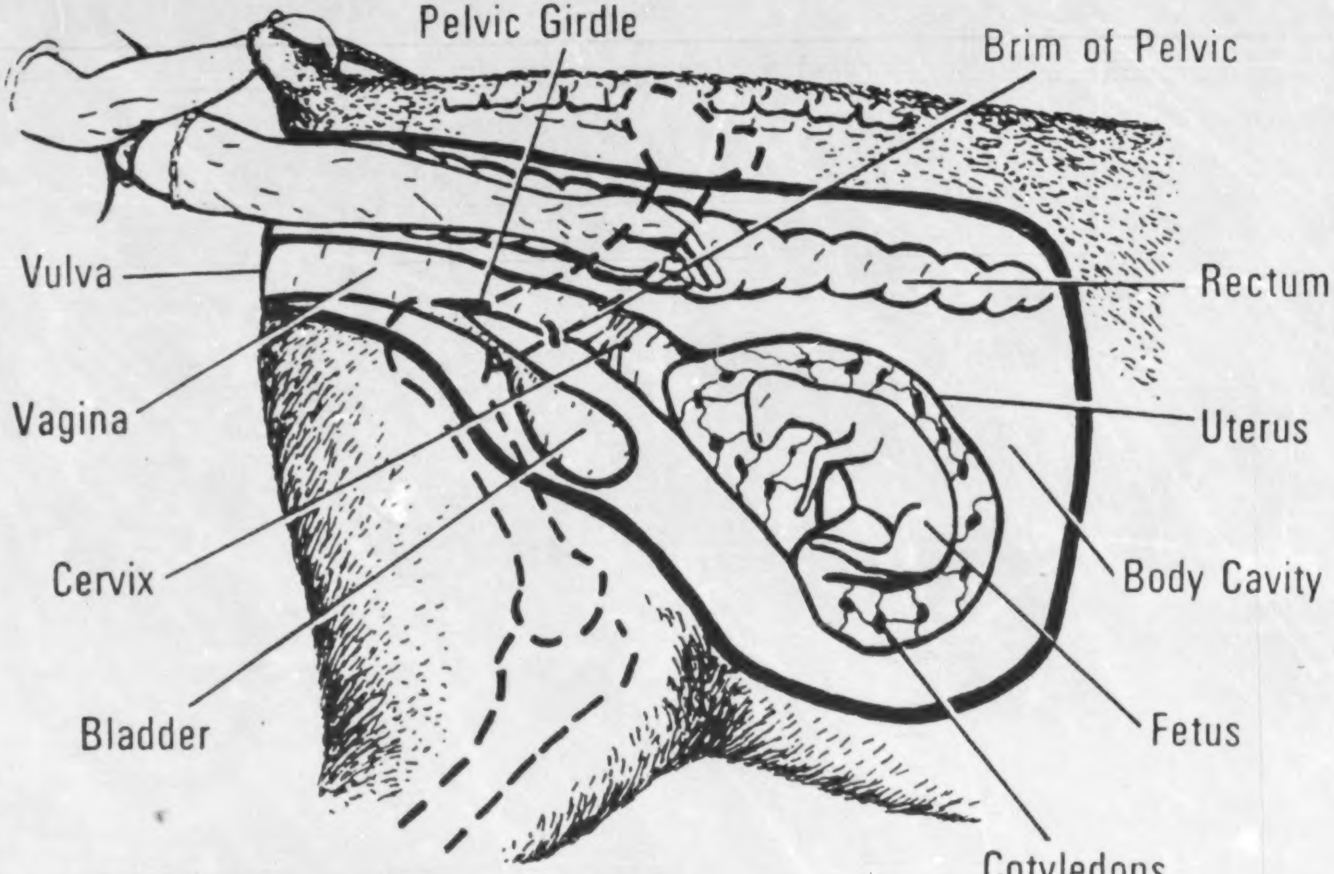
1. Produces an irregular progesterone activity with a peak at about 70 days which is maintained for 50 days. Then the level is low until a brief rise just prior to parturition and a drop at parturition

2. Estrogen rises to a peak at day 200 before decreasing and maintaining itself until parturition when it dives

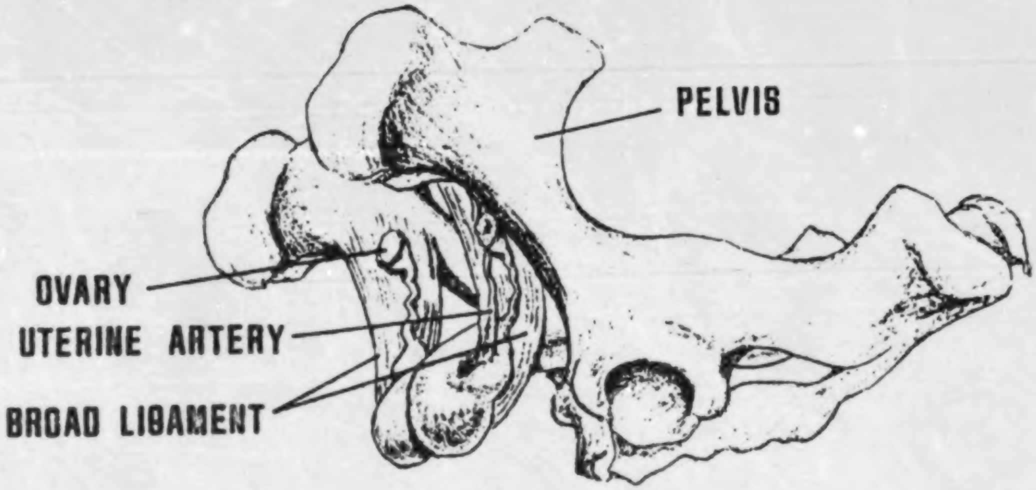
3. Pregnant mare serun gonadotropin is produced by endometrial cups starting 35 to 40 days after conception. This hormone is one rich in follicle stimulating activity with lesser luteinizing activity. Its production lasts for a period of 100 days and gradually disappears as the cups disappear by the 150th day of pregnancy

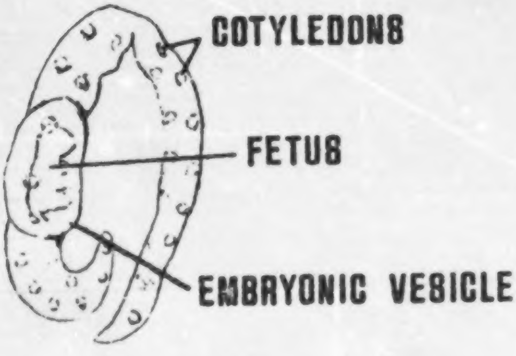
    a. This phenomenon is the basis for pregnancy blood testing

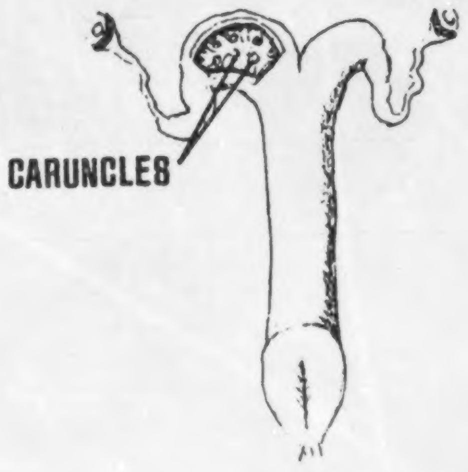
Parts of Reproductive Tract Positioned Within Cow's Body



FEMALE REPRODUCTIVE TRACT







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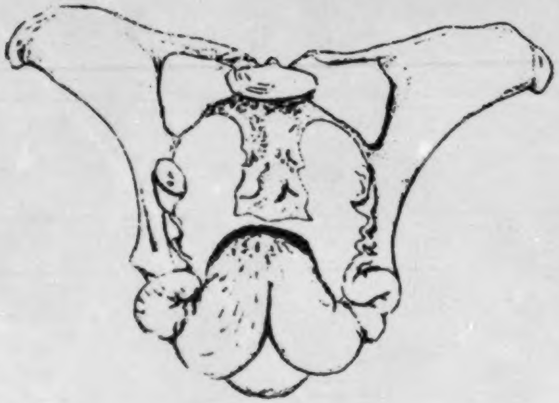
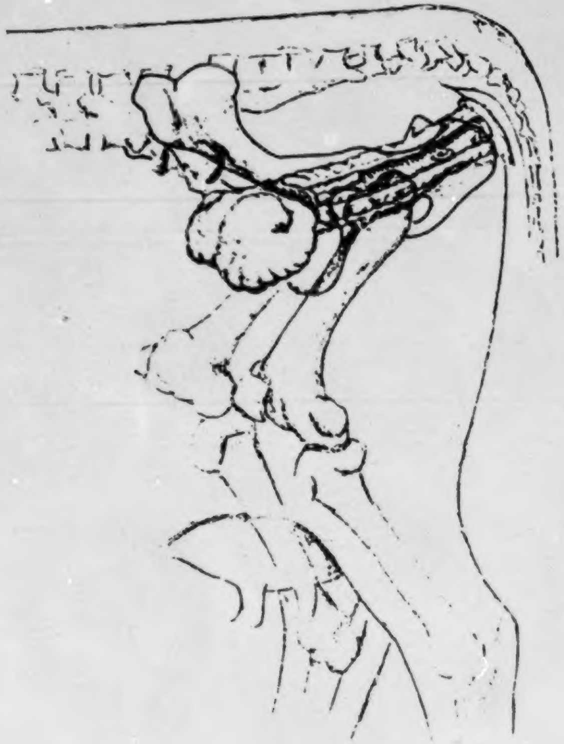
THE RELATIONSHIP OF THE REPRODUCTIVE TRACT TO THE PELVIS



Front view



Side view

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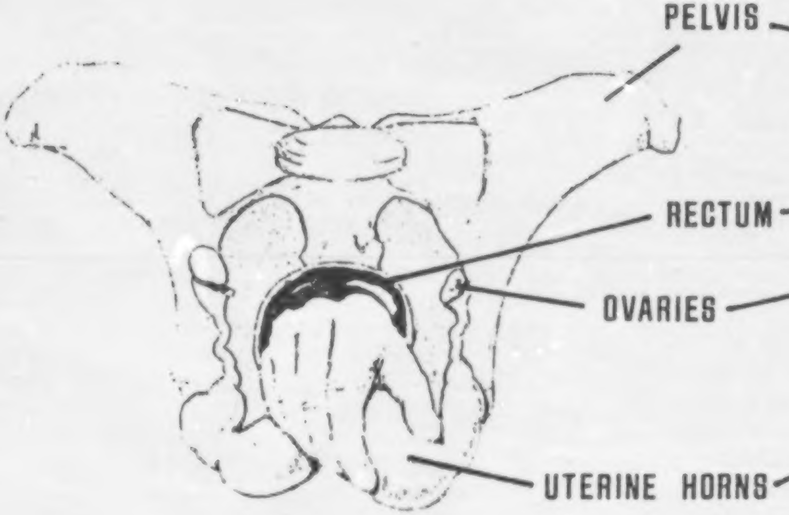
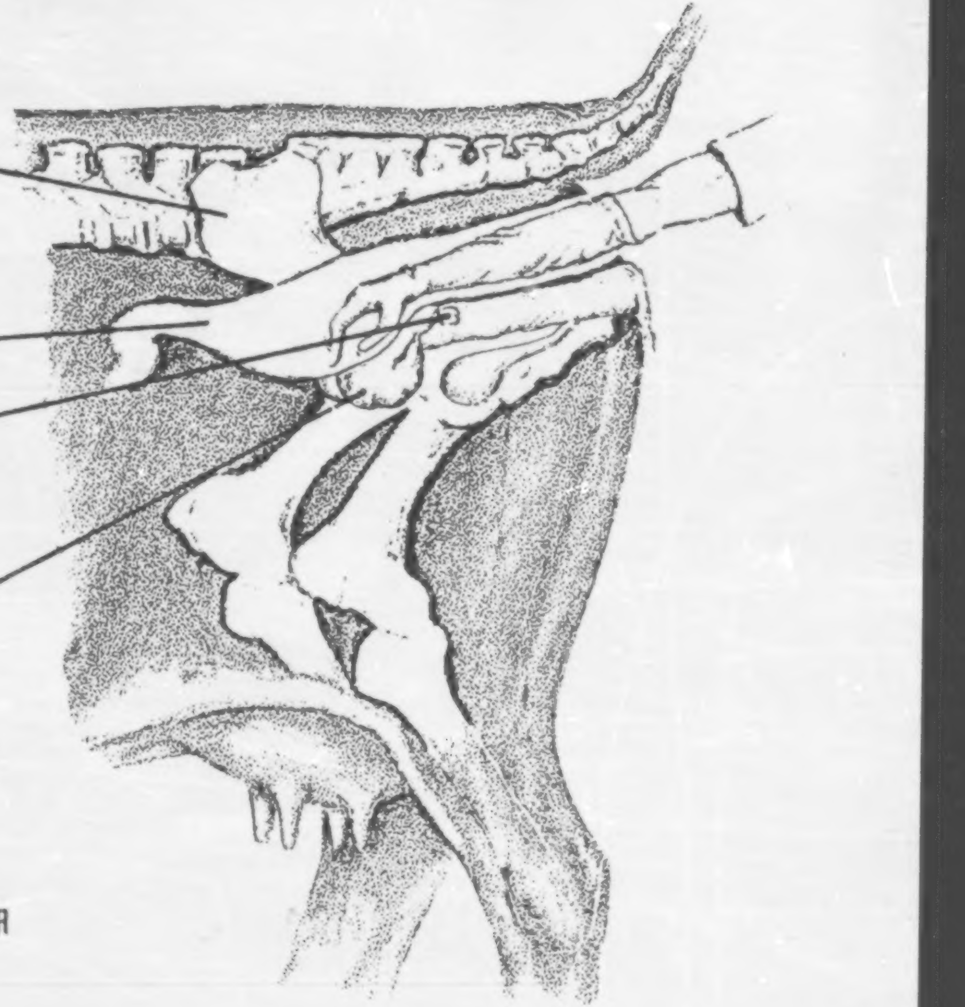
POSITION OF THE HAND IN PALPATION

IN

INSERTING HAND INTO RECTUM

PUSHING FECAL MATTER ASIDE

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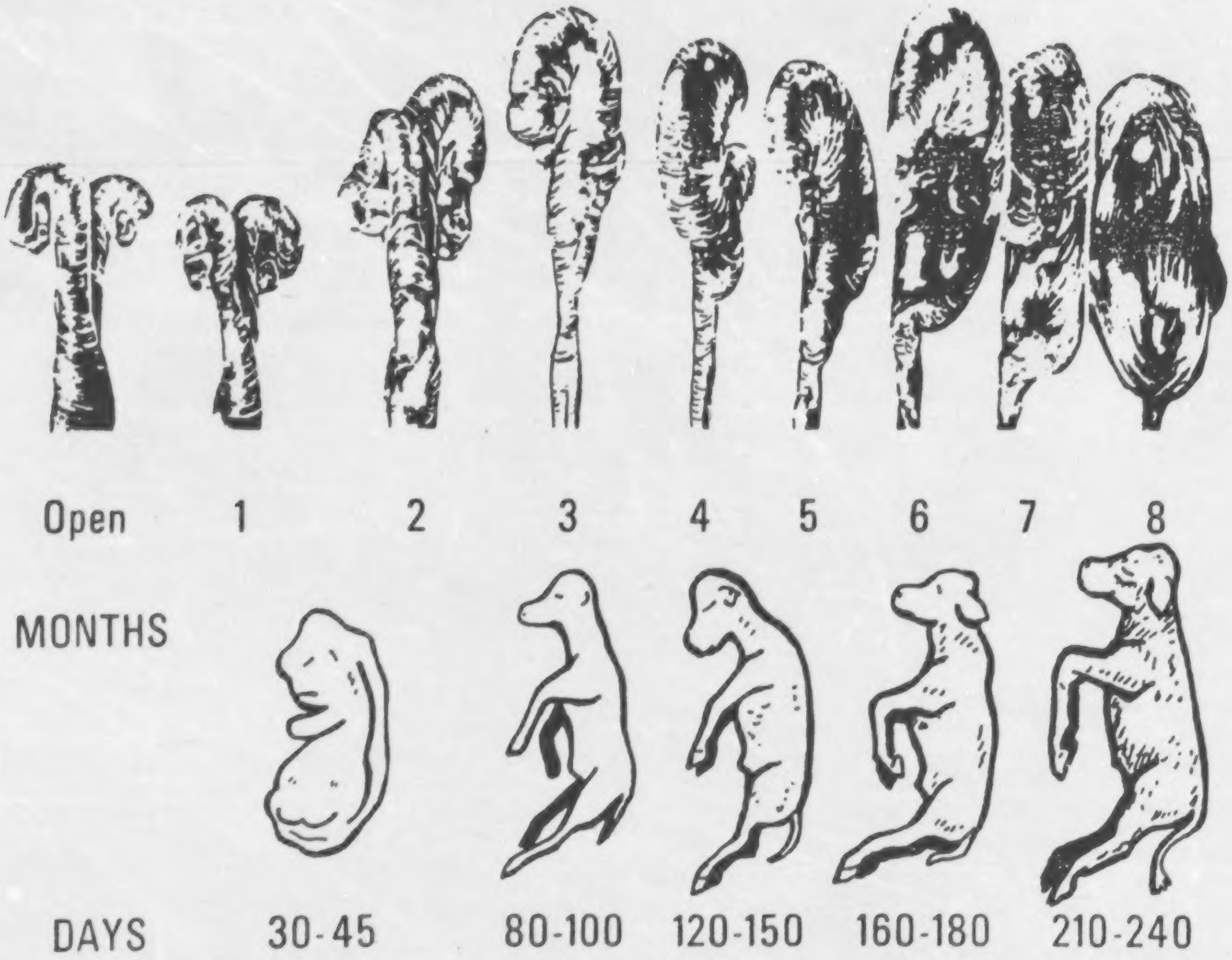
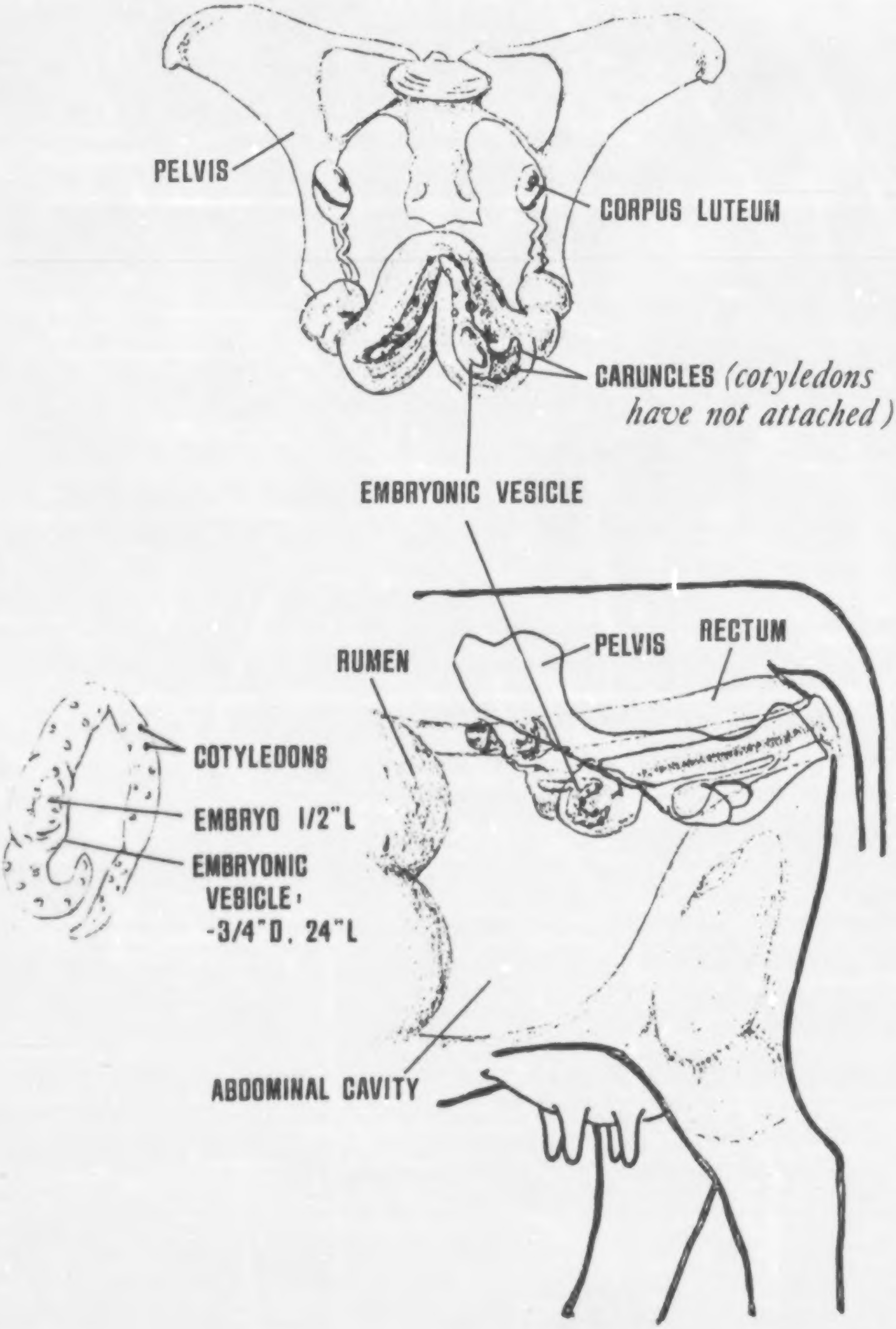
Stages of Pregnancy



Ag. III - 62-B

30 DAY PREGNANCY

T6



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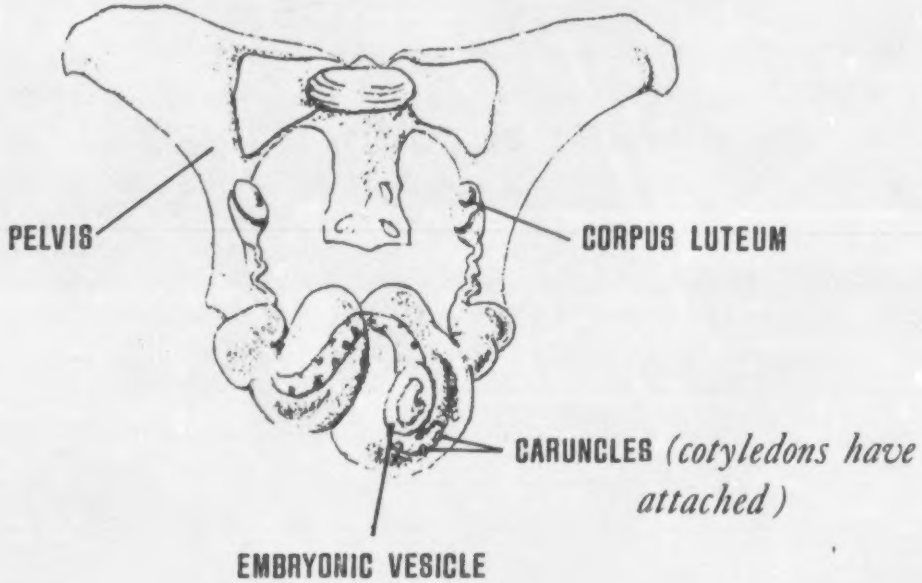
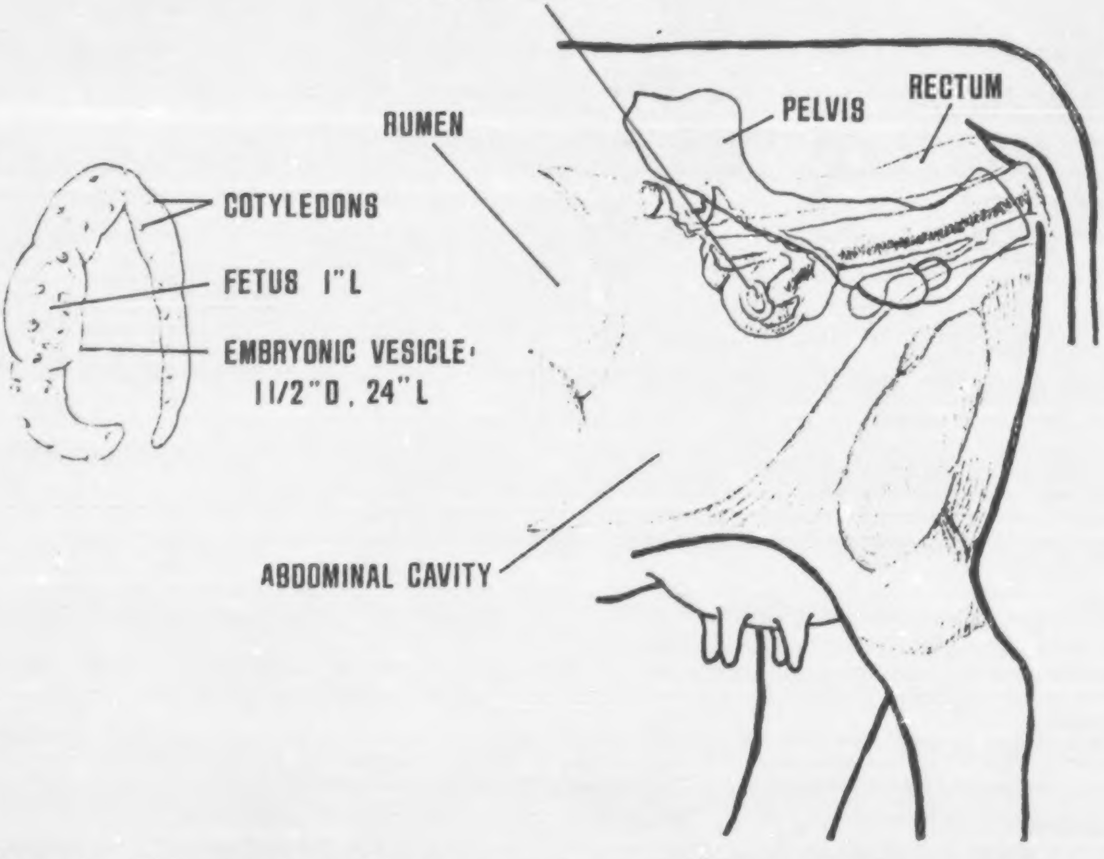
45 DAY PREGNANCY





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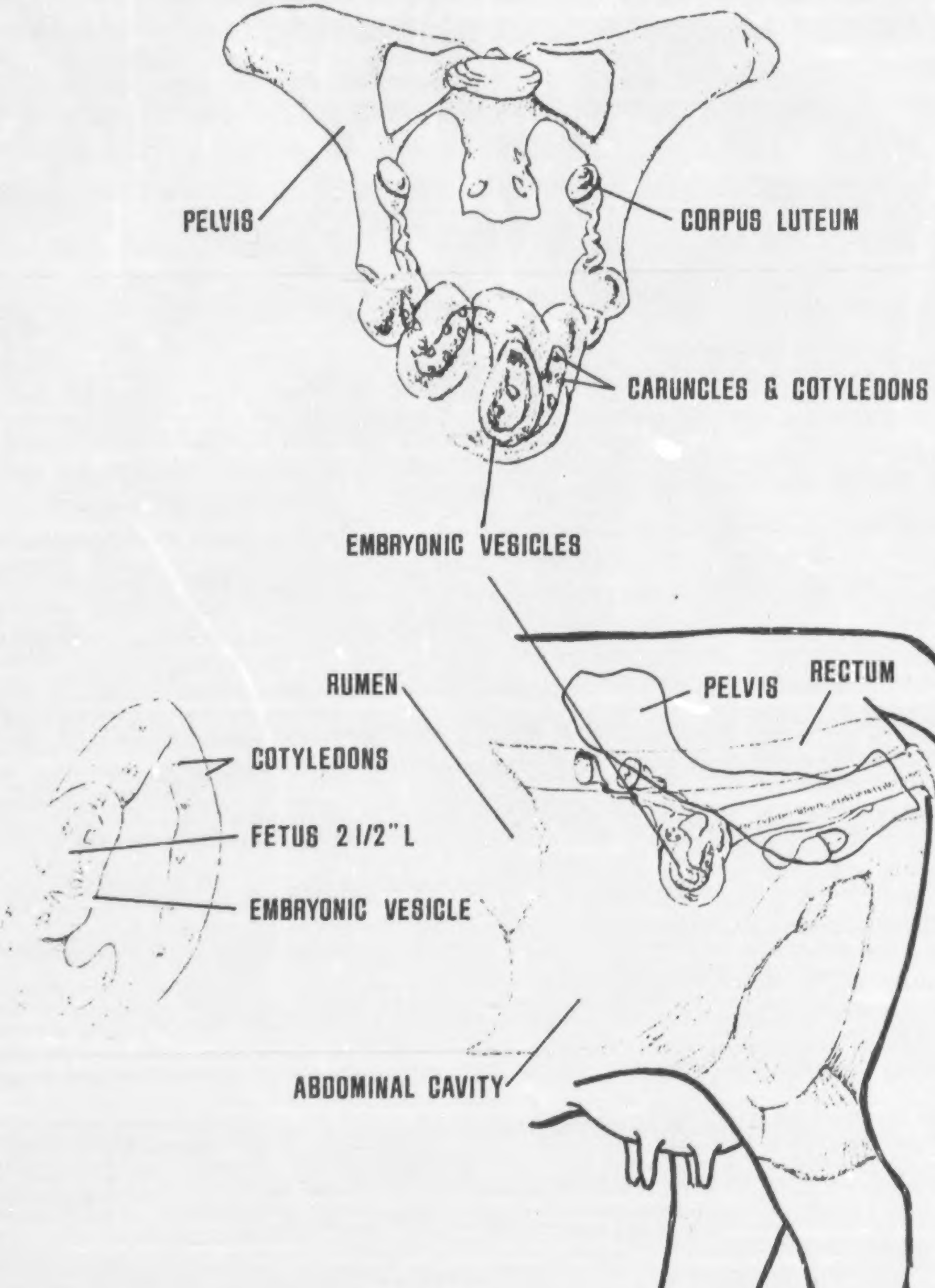
60 DAY PREGNANCY



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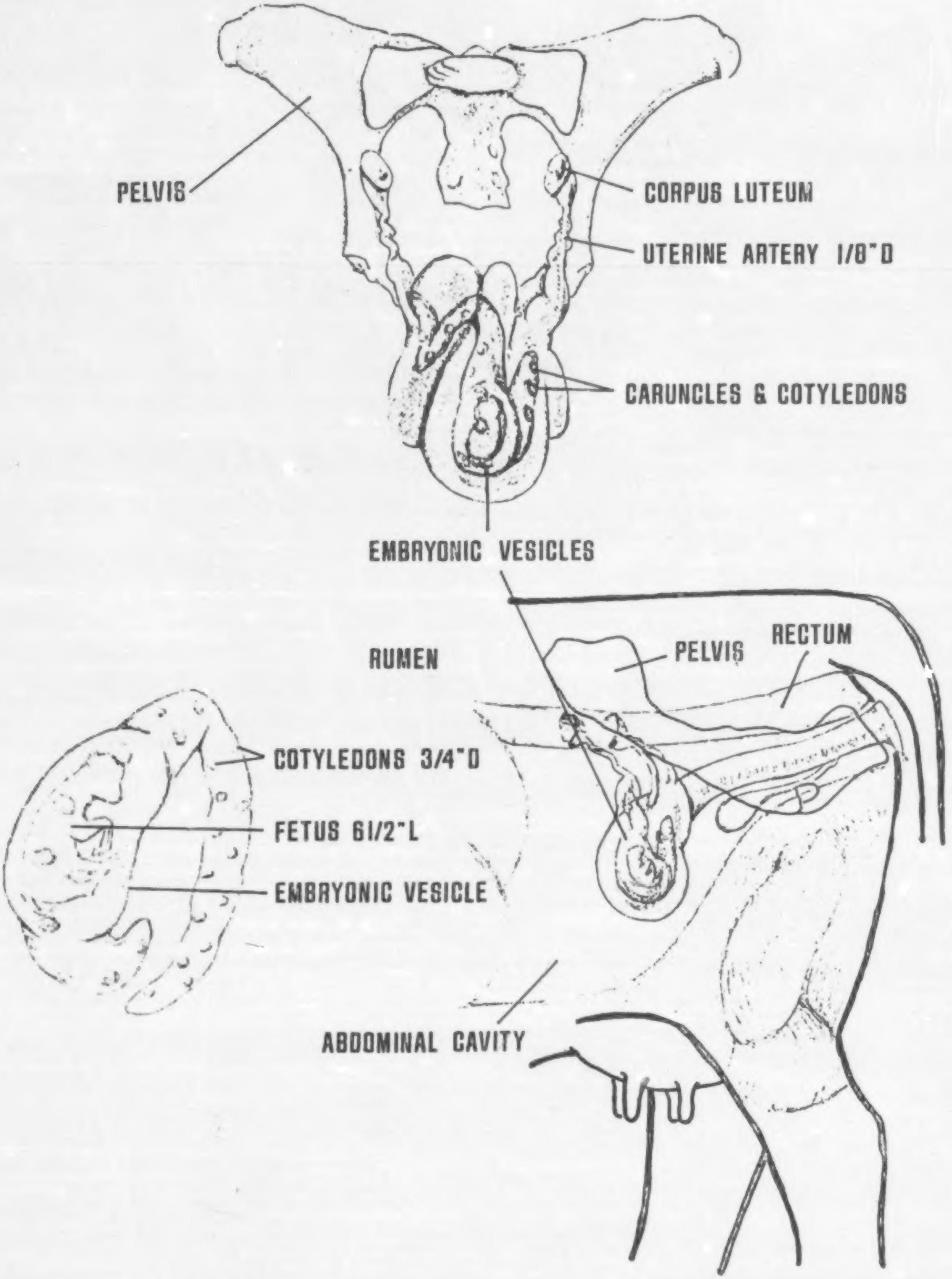
90 DAY PREGNANCY



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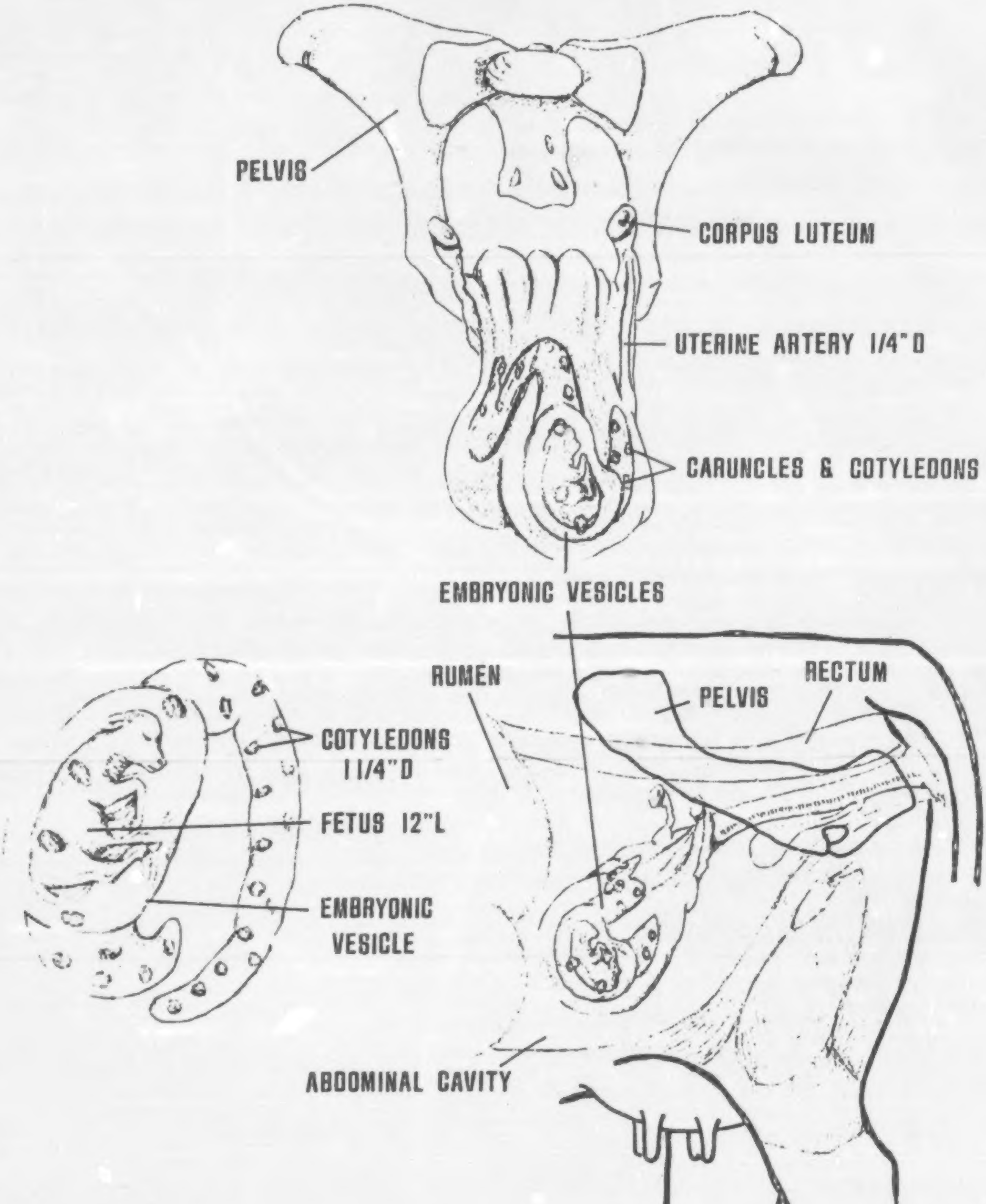
120 DAY PREGNANCY



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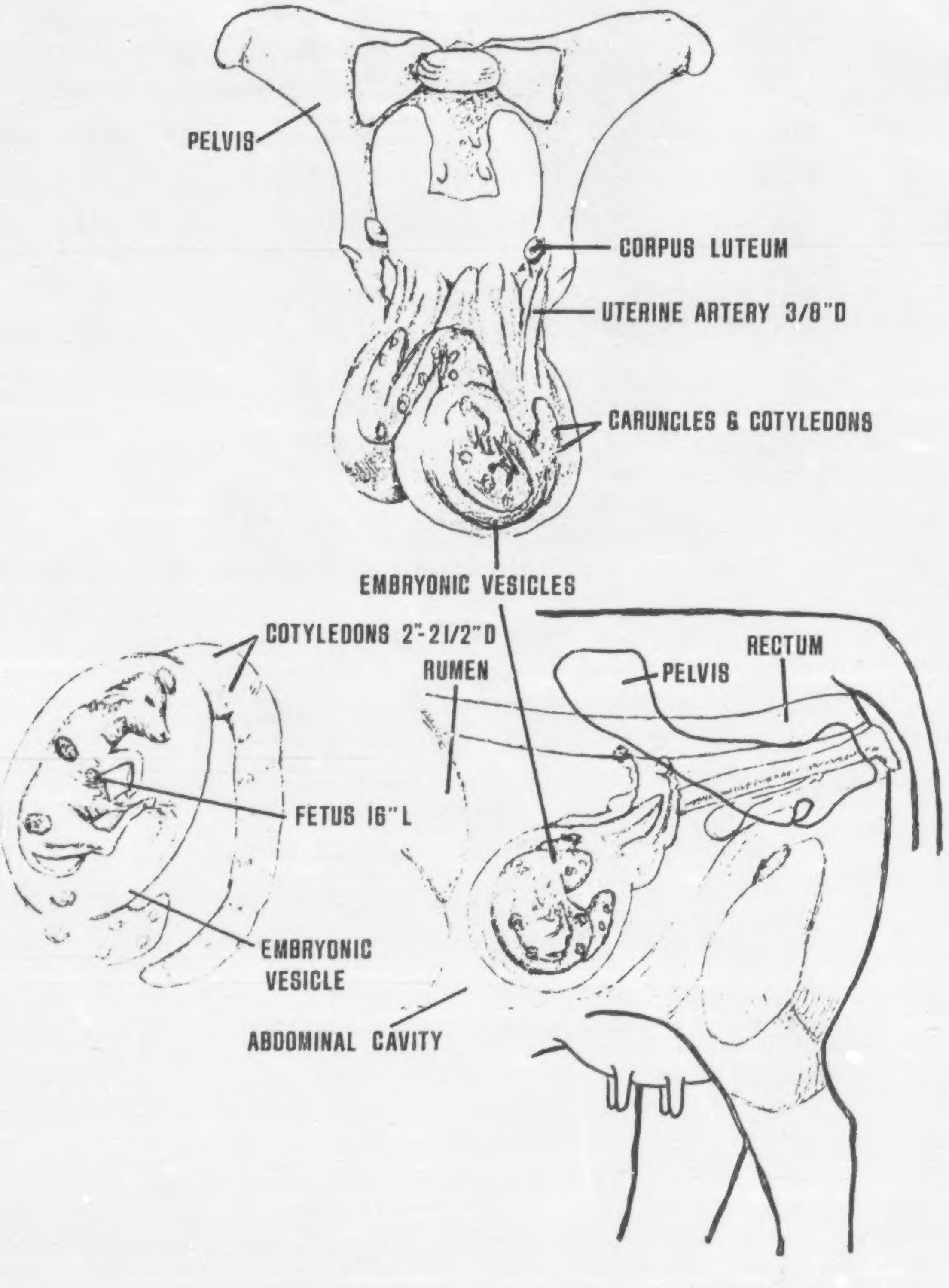
150 DAY PREGNANCY



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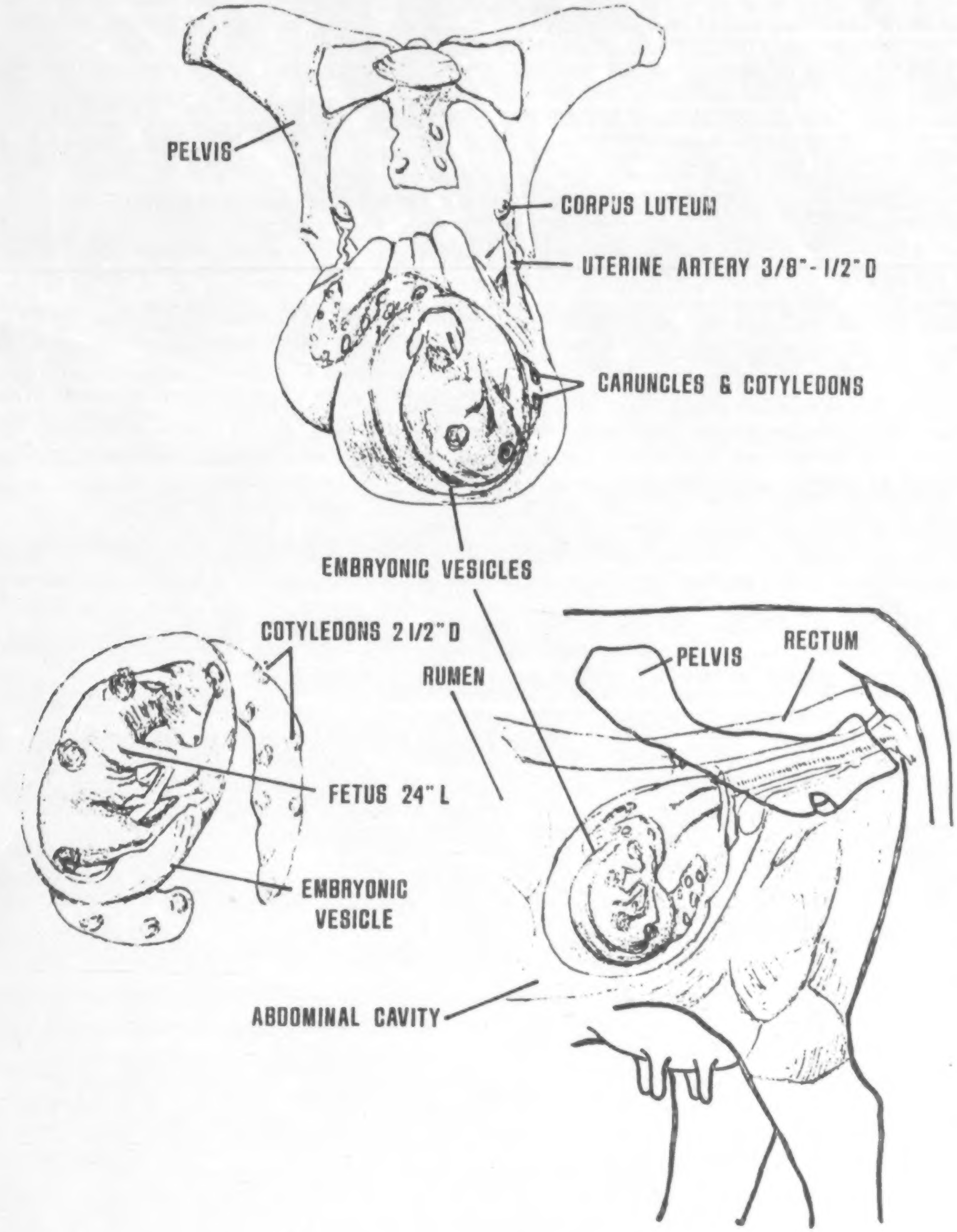
180 DAY PREGNANCY



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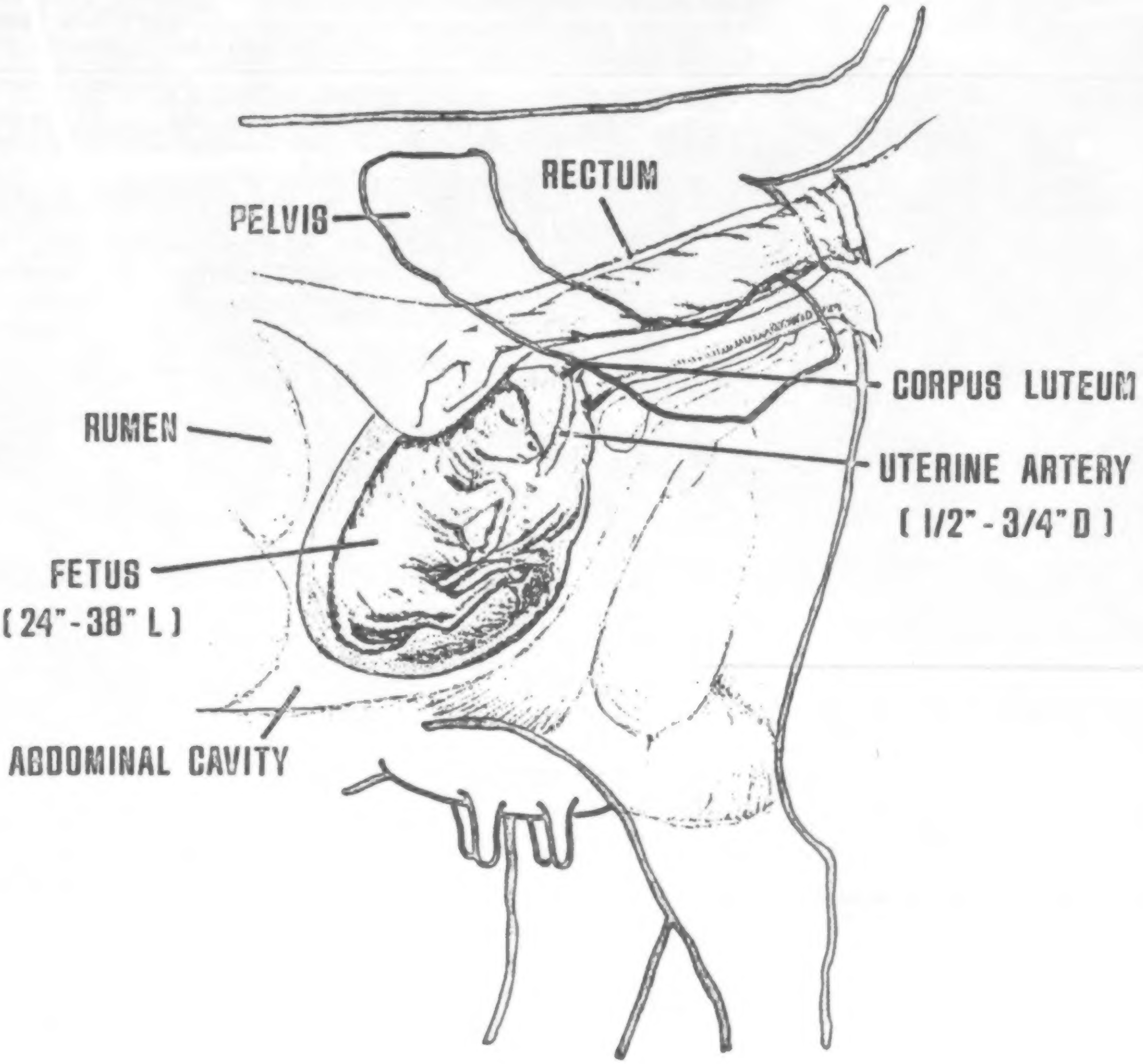
713

210 DAYS TO PARTURITION

(FETUS MAY BE FELT)



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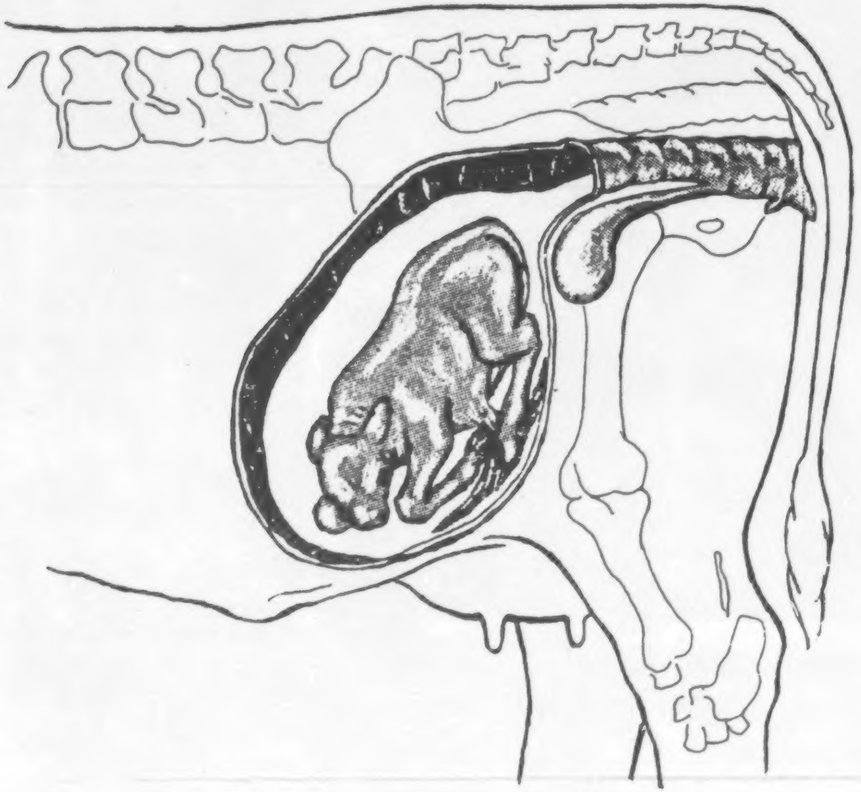
NORMAL POSITION OF FETUS



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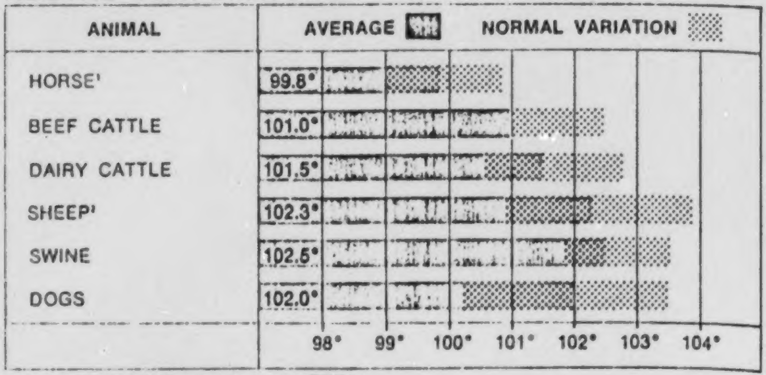
77
/15

TEMPERATURE
HEAT PERIOD
GESTATION

RECTAL TEMPERATURE



[1] Body temperature higher in young, lower in old age.

[2] Body temperature higher when in full fleece.

HEAT PERIOD OF ANIMALS

Animal	Duration of Heat Period		Regularity of Heat Days Cycle		First Occurrence After Parturition
	Range	Average	Average	Variation	
Mare	2-11 days	6 days	22	16 to 30	3 to 15 days
Cow	8-30 hours	16 hours	21	18 to 24	30 to 60 days
Sow	1-5 days	2-3 days	21	18 to 24	1 to 8 weeks
Ewe	1-3 days	35 hours	16½	14 to 20	Depends upon breed, environment, and management
Goat	2-3 days	2½ days	21	15 to 24	
Bitch	4-13 days	9 days	Usually once during each seasonal period		
Cat	7-21 days				

APPROXIMATE PERIODS OF PREGNANCY (days)

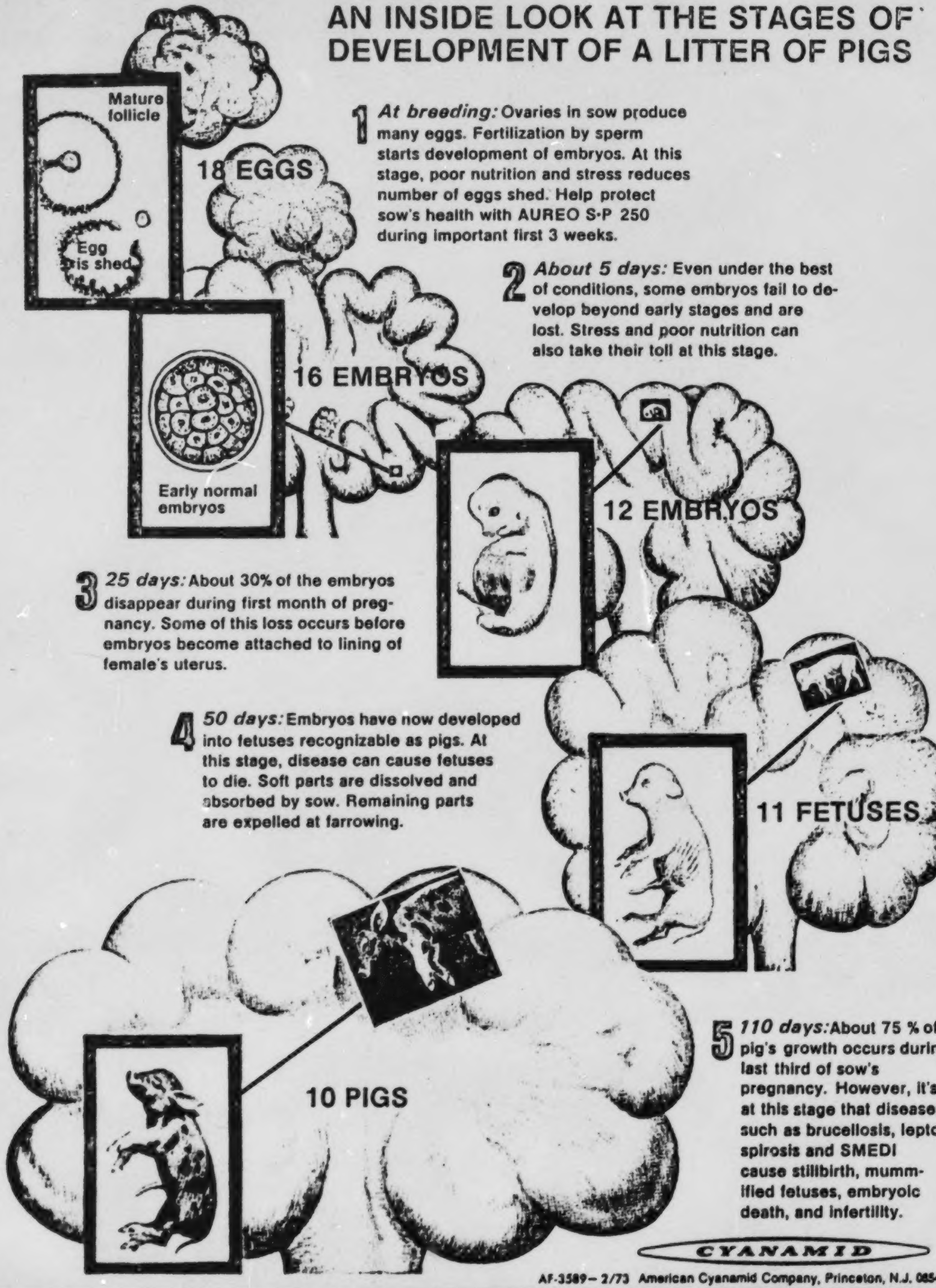
Animal	Range	Average
Mare	329 - 346	336
Cow	274 - 291	282
Sow	110 - 116	113
Ewe	140 - 160	150
Goat	140 - 160	151
Bitch	58 - 63	60
Cat		64

or
↓

SWINE GESTATION TABLE (114 DAYS)

Bred	Jan.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Jan.
Farrow	April	25	26	27	28	29	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	May
Bred	Feb.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28				Feb.
Farrow	May	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22				June
Bred	March	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	March
Farrow	June	23	24	25	26	27	28	29	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	July
Bred	April	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		April
Farrow	July	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		Aug.
Bred	May	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	May
Farrow	Aug.	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	Sept.
Bred	June	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		June
Farrow	Sept.	23	24	25	26	27	28	29	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		Oct.
Bred	July	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	July
Farrow	Oct.	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	Nov.
Bred	Aug.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Aug.
Farrow	Nov.	23	24	25	26	27	28	29	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Dec.
Bred	Sept.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		Sept.
Farrow	Dec.	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		Jan.
Bred	Oct.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Oct.
Farrow	Jan.	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	Feb.
Bred	Nov.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		Nov.
Farrow	Feb.	23	24	25	26	27	28	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		March
Bred	Dec.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Dec.
Farrow	March	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	April

AN INSIDE LOOK AT THE STAGES OF DEVELOPMENT OF A LITTER OF PIGS



1 *At breeding:* Ovaries in sow produce many eggs. Fertilization by sperm starts development of embryos. At this stage, poor nutrition and stress reduces number of eggs shed. Help protect sow's health with AUREO S·P 250 during important first 3 weeks.

2 *About 5 days:* Even under the best of conditions, some embryos fail to develop beyond early stages and are lost. Stress and poor nutrition can also take their toll at this stage.

3 *25 days:* About 30% of the embryos disappear during first month of pregnancy. Some of this loss occurs before embryos become attached to lining of female's uterus.

4 *50 days:* Embryos have now developed into fetuses recognizable as pigs. At this stage, disease can cause fetuses to die. Soft parts are dissolved and absorbed by sow. Remaining parts are expelled at farrowing.

5 *110 days:* About 75 % of pig's growth occurs during last third of sow's pregnancy. However, it's at this stage that diseases such as brucellosis, leptospirosis and SMEDI cause stillbirth, mummified fetuses, embryoic death, and infertility.

CYANAMID

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ANIMAL BREEDING

UNIT IV

ASSIGNMENT SHEET # 1: Pregnancy Test Cows

I. Tools and equipment

  A. Chute

  B. Plastic gloves

  C. Lubricant

  D. Cow showing indications of pregnancy

II. Procedures

  A. Place cow in chute

  B. Place plastic glove on left hand

  (NOTE: Be sure to remove any jewelry that you might be wearing.)

  C. Wet plastic glove with water and apply lubricant

  D. Grasp the cow's tail with right hand and move the tail to the left side of the cow

  E. Using left hand and arm, insert into the cow's rectum to a depth of approximately six inches

  (CAUTION: This should be done in such a manner to not damage the cow or the fetus.)

  F. If rectum is full of feces, you might have to remove some in order to be able to palpate with the fingers

  G. Locate the cervix and position in hand in the same manner as in artificial insemination

  H. Notice position of cervix in relation to pelvic cavity

  (NOTE: If cervix is not found on pelvic floor at an approximate depth of six inches, it is a good indication that the cow could be pregnant. If this is the case, while holding the cervix in the hand, attempt to pull the cervix back up on the floor of the pelvic girdle for easier palpation.)

  I. Without turning loose of reproductive tract, move hand slowly down the tract to the separation of the uterus where the two uterine horns lead off

  J. Palpate each horn in order to determine if one horn is larger than the other

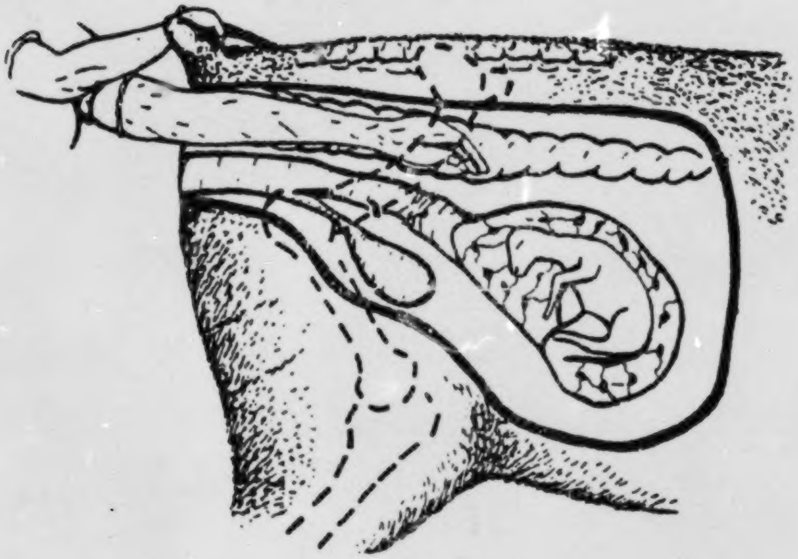
  (NOTE: Remember, do not turn loose of the tract, because you might forget which horn you are palpating and become confused.)

  (CAUTION: Do not squeeze the horns but simply rub or palpate each horn.)

K. While at this stage of your examination, rely on the different stages and indications of pregnancy and determine if the cow you are examining is pregnant

L. Reveal your findings to the instructor for his evaluation

III. Diagram of procedures



ANIMAL BREEDING

UNIT IV

TEST

1. Define the following terms:

   a. Pregnancy

   b. Sterility

   c. Estrus cycle

   d. Conception

   e. Cryptorchidism

2. Name five advantages of pregnancy testing cows

   a.

   b.

   c.

   d.

   e.

3. Name five advantages of fertility testing bulls

   a.

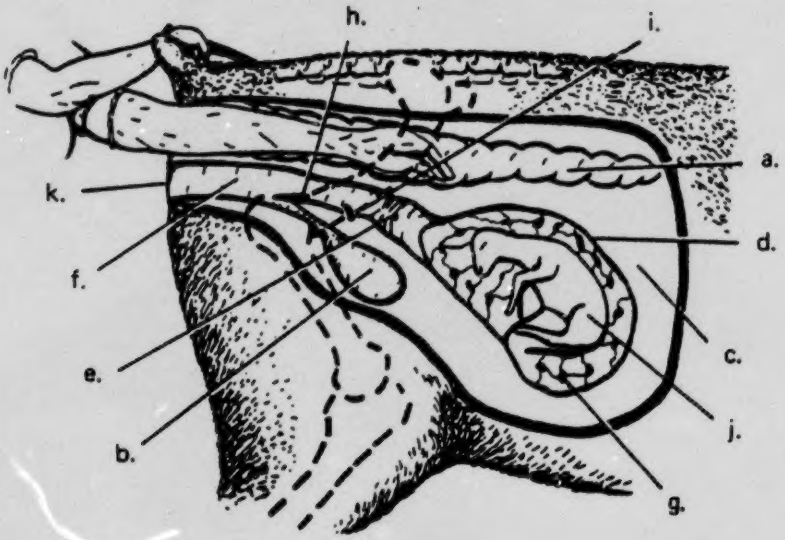
   b.

   c.

   d.

   e.

4. Identify the following parts of the female reproductive tract.



a.____________________________

b.____________________________

c.____________________________

d.____________________________

e.____________________________

f.____________________________

g.____________________________

h.____________________________

i.____________________________

j.____________________________

k.____________________________

5. Name the five distinct indications of pregnancy while using the rectal examination.

a.

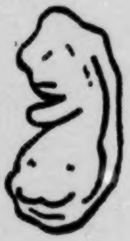
b.

c.

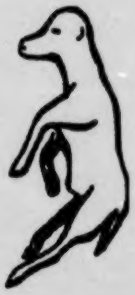
d.

e.

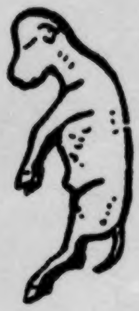
6. Identify the following stages of pregnancy by writing the month of pregnancy in the blank provided.



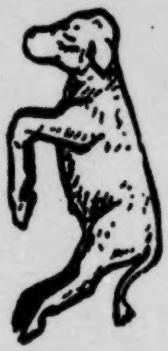
a.______________________________



b.______________________________



c.______________________________



d.______________________________

7. What is the most difficult stage of pregnancy to detect using the rectal examination?

8. Discuss in a short paragraph why the left arm and hand should be used when rectally examining cows for pregnancy.

TEST

9. Name six causes of sterility and delayed breeding in bulls

   a.

   b.

   c.

   d.

   e.

   f.

10. Name and discuss the three grades of semen

    a.

    b.

    c.

11. Name the three periods during the year that represent the most practical time for checking bulls for sterility.

    a.

    b.

    c.

12. List range of gestation by species

    a. Sheep -

    b. Swine -

    c. Mares -

    d. Cow -

13. Name the hormone of gestation?

14. Demonstrate the ability to detect pregnancy in cattle by using the rectal examination.

ANIMAL BREEDING

UNIT IV

ANSWERS TO TEST

1. a. Pregnancy - The term used to indicate that an animal is carrying a young fetus
   b. Sterility - A temporary or permanent reproductive failure
   c. Estrus cycle - The time elapsing from one heat period to the next
   d. Conception - The female and male germ cells' meeting and fertilization occurring without future heat cycles
   e. Cryptorchidism - When one or both testicles of a bull have not descended to the scrotum

2. Any five of the following:
   a. Cuts winter feed bills
   b. Identifies pregnant cows
   c. A means of culling cows from herd
   d. Slaughter cows will bring a higher return if known to be open
   e. Purebred animals will bring more money if known to be safely in calf
   f. Increases profit

3. Any five of the following:
   a. Prevents loss of calf crop
   b. Increases calf crop
   c. Means of selecting bulls
   d. Means of culling bulls from herd
   e. Shortens calving season
   f. Increases profit

4. a. Rectum
   b. Bladder
   c. Body cavity
   d. Uterus
   e. Cervix
   f. Vagina
   g. Cotyledons

ANSWERS TO TEST

h. Pelvic girdle

i. Brim of pelvic

j. Fetus

k. Vulva

5. a. Palpation of fetus

   b. Presence of fluid in uterine horn

   c. Presence and size of cotyledons

   d. Diameter and pulse rate of uterine artery

   e. Location of uterus to the relationship of pelvic floor

6. a. 30-45 days

   b. 80-100 days

   c. 120-150 days

   d. 210-240 days

7. 160-180 days

8. Discussions should reveal that most pregnancies occur on the right side of the cow, and while pregnancy testing, using the rectal examination, the body is positioned in such a manner that the left arm has a tendency to move to the right side of the cow.

9. a. Poor semen

   b. Physical defects and injuries

   c. Psychological

   d. Infection and diseases

   e. Poor management and feeding

   f. Inherited abnormalities

10. a. Satisfactory - Semen that has a good density indicated by a milky white ejaculate

    b. Questionable - Semen that has a single or combination of low values for density, mobility, and rate of movement

    c. Cull - Semen that has a watery color

ANSWERS TO TEST

11. a. Just before breeding season
    b. Soon after the breeding season
    c. Three to five months after the breeding season

12. a. Sheep 147-150 days
    b. Swine 113+ days
    c. Mares 336 days
    d. Cows 283 Av.

13. Progesterone

14. Performance skills will be evaluated by the instructor.

ANIMAL IMPROVEMENT

UNIT I

THEORY AND PRINCIPLES OF GENETICS

TERMINAL OBJECTIVE

Upon completion of this unit, the student will be able to select livestock using genetic principles according to species and environment. The student should be able to identify and manipulate the basic genetic material and theories, and should be able to predict offspring appearance using Mendel's principles and laws of probability for the greatest economically efficient use for his farm or ranch operation. This knowledge will be evidenced by achieving 85 percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, students will be able to:

1 Match genetic terms to the correct definitions.

2. List and discuss the three major components of genetic theory by species

3. Define, diagram and label mitosis and the two divisions of meiosis in the male and female animal.

4. State and illustrate Mendel's law of segregation and recombination of genes through P, F_1 , F_2 generations.

5. Determine the probability of offspring of four possible genotypes to illustrate recombination of genes in the zygote

6. Define and give an example of a mutation.

7. Match phenotypic-nonadditive expression of genes with definition or examples.

8. Define and give an example of an additive phenotypic expression of genes

9. Discuss in 50 words or less sex-linked inheritance and give an example.

10. List two examples of sex-influenced traits

11. List two examples of sex-limited traits and explain why they are sex-limited

12. Diagram M multiple gene traits for two and three heterozygous traits such as horned and whitefaced and body color.

ANIMAL IMPROVEMENT

UNIT I

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheet
2. Provide students with Information and Assignment Sheets
3. Assign selected pages and chapters from reference material for out of class reading
4. Make transparencies
5. Discuss Terminal and Specific Objectives with student
6. Discuss Information and Assignment Sheets with student
7. Arrange a field tour of purebred and crossbred livestock operations in your community
8. Give post Test

Students:

1. Read Objective Sheet
2. Study Information Sheets and assigned reading
3. Complete Assignment Sheets and turn into instructor for grading
4. Participate in field trip
5. Take Test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objective Sheet
2. Information Sheets
3. Transparency Masters

   TM 1 - PARTS OF AN ANIMAL CELL

   TM 2 - GENE HEREDITARY CHARACTERISTICS

   TM 3 - SEX DETERMINATION IN ANIMALS

   TM 4 - STEPS IN CELL DIVISION IN GROWTH (MITOSIS)

INSTRUCTIONAL MATERIALS

TM 5 - MITOSIS

TM 6 - MEIOSIS

TM 7 - 2ND MEIOTIC DIVISION

TM 8 - SKETCH OF SPERMATOGENESIS AND OÖGENESIS

TM 9 - MENDEL'S PRINCIPLES - 1ST PRINCIPLE

TM 10 MENDEL'S PRINCIPLES - 2ND PRINCIPLE

TM 11 A DIAGRAM FOR DETERMINING THE PROBABLE RESULTS FROM A DOMINANT AND RECESSIVE CHARACTER

TM 12 COLOR DETERMINATION IN SHORTHORNS

TM 13 A CROSS WITH TWO CHARACTERS

TM 14 IMPROVING ANIMALS THROUGH BREEDING

4. Assignment Sheets

   #1 - Frequency of Genes in a Population

   #2 - Multiple Gene Traits

5. Answers to Assignment Sheets

6. Test

7. Answers to Test

References:

Books:

1. Blakely, James and Bade, D.H. The Science of Animal Husbandry, 2nd Edition 1979; Reston Publishing C. Inc Reston, Virgina.

2. Campbell, J.R. and Lasley J.F. The Science of Animals That Serve Mankind 2nd Edition 1975: McGraw-Hill, Inc.

3. Cole, H.H. and Garrett, W.N. Animal Agriculture 1980: W.H. Freeman and Company.

4. Lasley, John F. Genetics of Livestock Improvement 3rd Edition, 1978 Prentice-Hall, Inc Englewood Cliffs N.J. 07632.

5. Warwick Everett J. and Legates, James E. Breeding and Improvement of Farm Animals. 7th Edition 1979: McGraw-Hill Book Company.

INSTRUCTIONAL MATERIALS

Transparencies:

1. Animal Genetics and Breeding Overhead Transparency Masters, Vocational Agriculture Service, 434 Mumford Hall, Urbana, Illinois 61801.

2. Genetics. Overhead Transparency Masters, California State Polytechnic College, San Luis Obispo, California.

ANIMAL IMPROVEMENT

UNIT I

INFORMATION SHEET

I. Terms and Definitions

A. Autosomes - Chromosomes other than the sex chromosomes

B. Alleles or Allelomorphs - One gene of a pair has one effect while another gene in that same pair has different effect on same trait

C. Chromosome - Dark-staining rod-like or rounded paired bodies visible under the microscope at the metaphase of cell division and contains a long DNA molecule or gene

D. Dam - The mother of an individual

E. Dihybrid - An individual that is heterozygous for two pairs of genes

F. Diploid - Normal paired chromosomes in body cells

G. Dizygotic twins - A set of twins derived from two separate fertilized eggs.

H. DNA - A deoxyribonucleic acid molecule

I. Dominant - Describes a gene that covers up the expression of its allele when paired together in body cells

J. Epistasis - Interaction of two or more pairs of genes that are not alleles to produce a phenotype that they don't produce when they occur separately

K. F_1 generation - The first generation progeny following the parental

L. F_2 generation - The second generation progeny following the parental

M. Fertilization - Union of the male and female gametes to form new individual

N. First meiotic division - First of two divisions occurring in reductional cell division and resulting in the production of two cells

INFORMATION SHEET

O. Gamete - The sperm or ovum. Male or female reproductive cell

P. Gametogenesis - Process of cell division that forms the sex cells

Q. Gene - Unit of inheritance

R. Genetics - A branch of biology that deals with the heredity and variation of organisms

S. Genotype - Actual genetic composition of an individual as determined by the genes it carries

T. Half sib - Half brother or half sisters

U. Haploid - Refers to cells that possess half-pairs of chromosomes

V. Heredity - Transmission of genetic or physical traits from the parents to their offspring

W. Heterozygote - An individual which possesses unlike genes in a pair found in body cells

X. Homozygote - Individual which possesses like genes in a pair found in body cells

Y. Lethal gene - Gene that cause the death of an individual who has them

Z. Linkage - Two or more genes located on the same chromosome so that they tend to be transmitted together

AA. Linked genes - Two or more genes that tend to be inherited together

BB. Locus - Region of a chromosome where a particular gene is located

CC. Meiosis - Type of cell division responsible for producing the sex cells which normally possess the haploid number of chromosomes

DD. Metaphase - Second stage of mitosis and meiosis in which the chromosomes are aligned on the equator or the spindle fibers

EE. Mitosis - Type of cell division in which cells with the diploid number of chromosomes produce daughter cells which also have the diploid number of chromosomes

INFORMATION SHEET

FF. Mutation - Change in a gene which may result in a change in the phenotype of an individual

GG. Nucleus - Deep staining body within the cell where the genes and chromosomes are located

HH. Overdominance - The interaction of members of a pair of genes to produce a phenotypic effect that is superior in the heterozygote to either homozygote

II. Parental generation - The first generation of a genetic experiment

JJ. Partial dominance - A situation where a gene is not completely, but partially, dominant to its own allele

KK. Phenotype - The appearance or performance of an individual that man can determine by his senses

LL. Prophase - The first stage of mitosis in which the chromosomes become shortened and thickened in appearance, the nuclear membrane disappears, and the spindle fibers become polarized

MM. Recessive gene - A gene whose phenotype expression is covered up by its own dominant allele

NN RNA - Ribonucleic acid molecule

OO. Second filial generation - The generation following the first filial (F_1) generation

PP Segregation of genes - Genes occur in body cells in pairs but in sex cells in half pairs. Thus a gene of a pair in the individual segregates from its mate when sex cells are produced

QQ Sex chromosomes - One pair of chromosomes in the individual are related to the sex of the individual

RR. Sex-influenced traits - The sex of the individual influences the phenotypic expression of certain genes

SS. Sex-limited traits - A situation where the trait is limited to one sex

TT. Sex linkage - Refers to genes that are carried on the non-homologous portion of the X-chromosome.

UU. Sire - The father of an individual

VV. Synapsis - The coming together or paired chromosomes during the first meiotic division

INFORMATION SHEET

WW. Telophase - Fourth stage of mitosis. Characterized by elongation of chromosomes, disappearance of spindle fibers, and reorganization of nuclear membrane

XX. Zygote - A cell resulting from the union of the male and female gametes

II. Genetic Theory

A. The cell (TM 1)

1. Size: 250,000 per inch or 250 trillion cells in a human body

2. Lifespan of red blood cells in human is 120 days

3. Major parts:

a. Cell wall

b. Protoplasm

i. Cytoplasm

ii. Nucleus

- Chromatin

- Chromosomes

B. Chromosomes

1. All chromosomes in body cells other than the sex chromosomes are known as autosomes. In cattle, there are 58 pairs of autosomes and one pair of sex chromosomes for a total of 60 pairs. Each calf receives one chromosome from his sire and the other from the dam. Pairs of chromosomes in body cells are referred to as the 2n number, or diploid number. In gametes, or sex cells, where only one of each pair of chromosomes is found, they are 1n, of haploid number of chromosomes.

2. Characteristic numbers of chromosomes in selected animals:

Animal	Chromosome numbers (2n)	Chromosome Pairs
Donkey	62	31
Horse	64	32
Swine	38	19

INFORMATION SHEET

Animal	Chromosome numbers (2n)	Chromosome Pairs
Sheep	54	27
Cattle	60	30
Man	46	23
Chicken	78	39

3. Some hereditary characteristics determined by genes (TM 2)
    a. Body size
    b. Color of hair coat
    c. Eye color
    d. Blood type
    e. Horns
    f. etc.

4. Determination of sex (TM 3)

C. Gene: the smallest unit of inheritance but a portion of a DNA molecule

1. DNA (deoxyribonucleic acid)
    a. Back-bone of the chromosome
    b. "Long" twisted ladder with two sides (polymer) joined together by rungs
    c. Sugar in DNA is deoxyribose
    d. Found almost entirely in cell nucleus
    e. Genetic information is stored in DNA in the form of a triplet code

2. RNA (Ribonucleic acid)
    a. Sugar is ribose
    b. A synthesized messenger from DNA to the cytoplasm

III. Cell Division

A. Mitosis (TM 4/5)

INFORMATION SHEET

1. Early prophase: nucleus containing two different pairs of chromatids (sister chromosomes)
2. Mid prophase: nuclear membrane disappears
3. Late prophase: spindle fibers form and chromatids become attached at the centromere
4. Metaphase: the chromatids align on the equator of the spindle fibers
5. Anaphase: centromeres of each chromosome separate into two centromeres, one with each chromatid which is now divided
6. Telephase: the nucleus is reformed and neuclear membrane appears and cytoplasmic division occurs
7. Interphase: the period between telophase of one division and the prophase of the next

B. Meiosis: is the cell division that forms the gametes (sex cells with the haploid (1n) number of chromosomes).

1. First meiotic division (nucleus only). (TM 6)
    - a. Early prophase: chromosomes shorten and thicken
    - b. Late prophase: homologous chromosomes pair up (synapsis) and form tetrads (a unit of four chromatids or four sister chromosomes).
    - c. Metaphase: spindle fibers form. Chromosomes align of spindle equator
    - d. Anaphase: each tetrad (a unit of four chromatids or four sister chromosomes) separates into two dyads (a unit of two sister chromatids)
    - e. Telophase: nuclear restructuring occurs and cytoplasm divides to form two like cells
2. Second meiotic division (nucleus only) (TM 7)
    - a. Prophase: chromosomes are haploid (having one of each kind of chromosomes in the nucleus)
    - b. Metaphase: spindle fibers form and chromosomes align on equator
    - c. Anaphase: each chromatid divides and moves to each mitotic center or centriole
    - d. Telephase: two nuclei are formed and cytoplasm divides

INFORMATION SHEET

3. Spermatogenesis: process of meiosis in the male gonads produces four spermatozoa (TM 8)

4. Oogenesis: process of meiosis in the female produces an ovum and three polar bodies (TM 8)

IV. Mendel's Two Major Principles

A. Segregation and recombination of genes

1. Principle of segregation (TM 9)

Separation of paired genes (allelic pairs) from one another and their distribution to different sex cells (gametes)

2. Principle of independent assortment (TM 10)

The genetic material contributed by one parent for several traits need not remain together, rather they have as much chance of passing into different sex cells (gametes) as of passing into the same one, or they segregate independently

V. Laws of Probability and Animal Breeding (TM 11)

A. Laws of probability apply to segregation of genes

1. An individual of genotype Aa will transmit gene A to one half of its offspring. The same is true for gene a, therefore, the probability is ½ or 0.5.

B. Laws of probability apply to recombination of genes in the zygote

1. Mating of genotypes Aa give the probability of offspring of the four possible genotypes

a. Probability

AA = 0.5 x 0.5 = 0.25
Aa = 0.5 x 0.5 = 0.25)
aA = 0.5 x 0.5 = 0.25) 0.5
aa = 0.5 x 0.5 = 0.25

b. Ratio - 1:2:1

INFORMATION SHEET

VI. Mutations

- A. A sudden, heritable change in genetic material
- B. Due to change in code sent to ribosomes by the gene by means of RNAm

VII. Phenotypic Expression of Genes - Nonadditive

- A. Recessive
  1. Genes that are covered up in the F_1 generation
  2. Are usually designated by the small letter of dominant gene
- B. Dominant (TM 11)
  1. A gene covers or hides the expression of its allele in the F_1 generation
  2. An example is black (B) in Angus cattle is dominant to the gene for red (b)
  3. Dominance designated by a capital letter
- C. Lack of dominance (TM 12)
  1. Sometimes the two alleles are not dominant to each other and if both are present they express themselves in the phenotype
  2. Coat color in Shorthorn cattle
- D. Partial dominance
  1. Some genes are only partially dominant to their alleles
  2. If we had normal cattle (cc) and crossed them with dwarf (CC) we would produce one comprest and one normal gene (Cc) causing the animal to by a comprest or ranking midway between normal and dwarf in size
- E. Overdominance
  1. Refers to phenotypic expression of genes in which the heterozygote (a^1a^2) is superior in phenotype to either homozygote (a^1a^1 or a^2a^2).

INFORMATION SHEET

F. Epistasis

1. Phenotypic expression of genes due to interaction of two or more pairs of genes that are not alleles

2. Color in collie dogs

VIII. Phenotypic Expression of Genes - Additive

A. Definition

1. The effect of each gene for a certain trait adds to the phenotypic effect of another gene for that same trait

2. An example is skin color in heritance

IX. Sex-linked Inheritance

A. In the male there is a portion of the Y chromosomes that has no counterpart in the X chromosome which will then express itself in the phenotype even if it is a recessive gene

B. Genes carried on this portion are transmitted only from father to son

X. Sex-Influenced Inheritance

A. Certain genes carried on the autosomes are present in body cells in pairs, but the sex of the individual determines whether the trait is dominant (in males) or recessive (in females)

B. Scurs in European cattle and horns in some sheep breeds

XI. Sex-limited Traits

A. Lactation in cattle is only expressed by the female

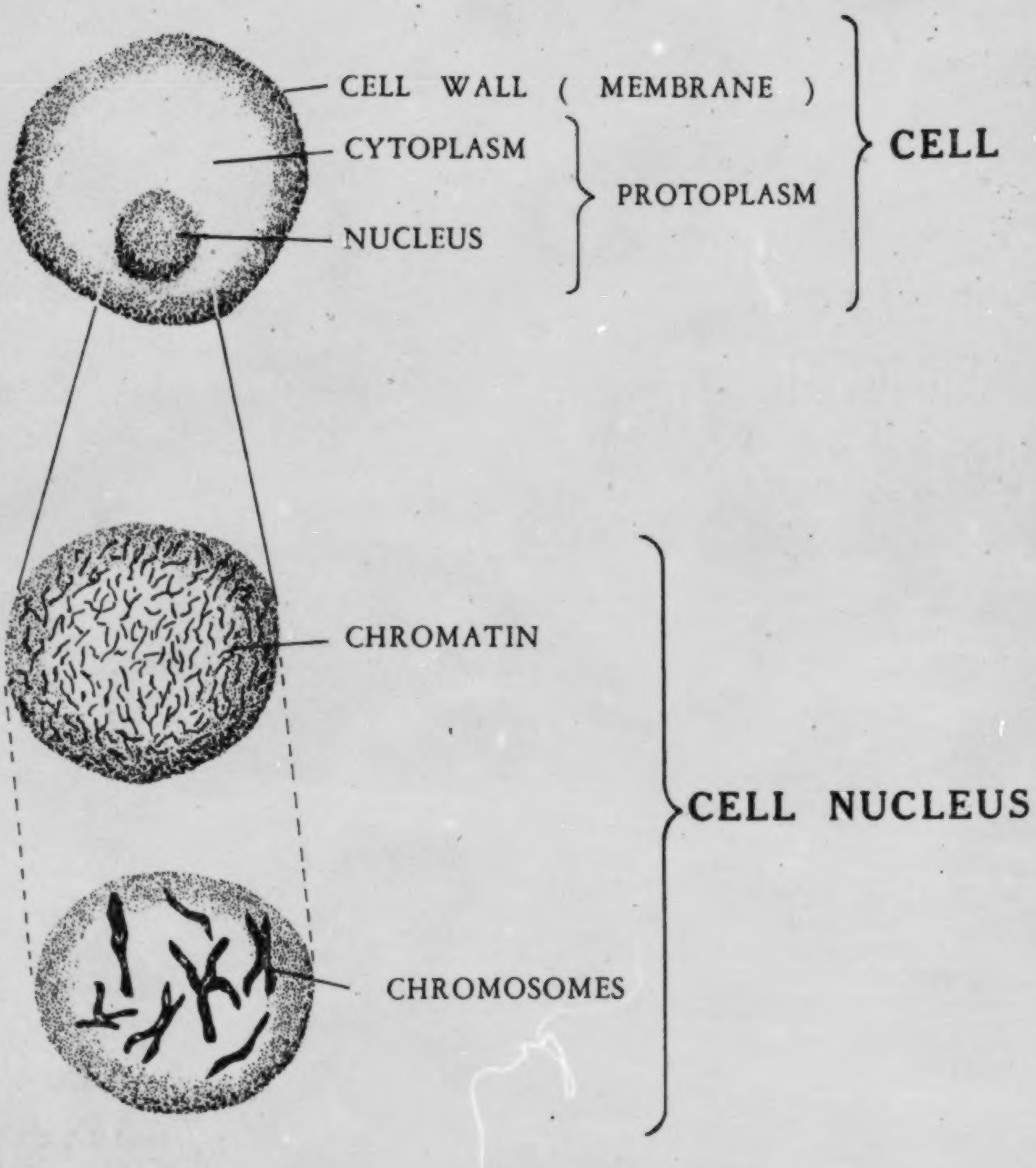
B. Egg laying is only expressed by the hens

XII. Multiple Gene Traits

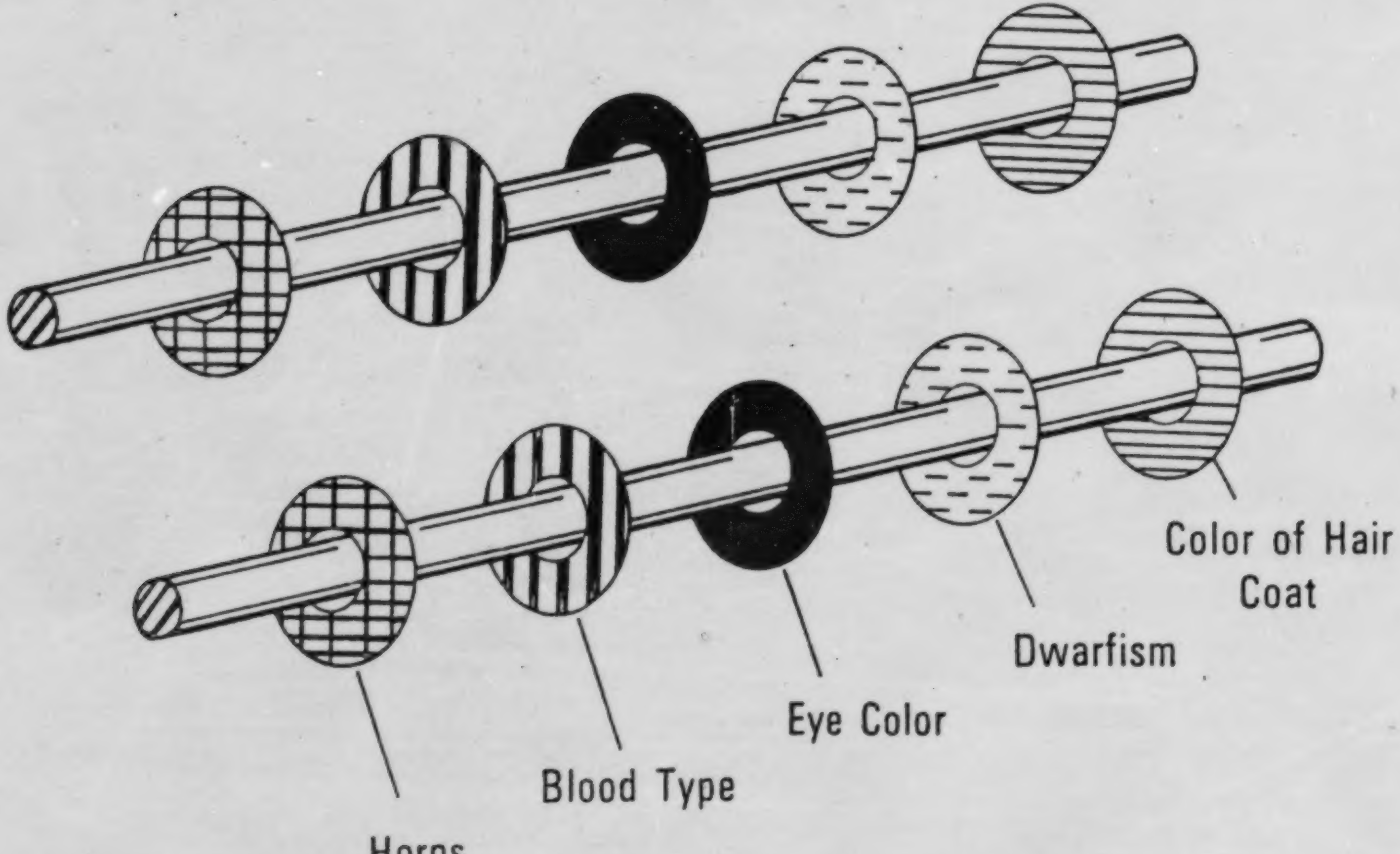
A. Cross between individuals impure for both horned and whitefaced traits should yield a ratio of 9 polled, whitefaced; 3 polled, colored faced; 3 horned, whitefaced; 1 horned, colored faced. (TM 13)

B. Cross between individuals with three heterozygous traits of black color; polled; and white face. (TM 14)

PARTS OF AN ANIMAL CELL



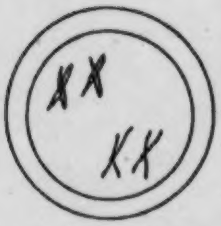
GENE HEREDITARY CHARACTERISTICS



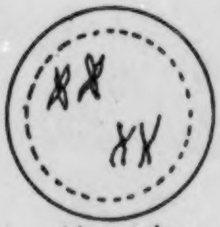
789

MITOSIS

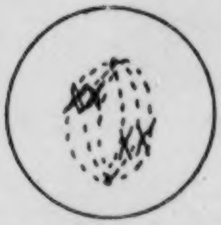
(nucleus only)



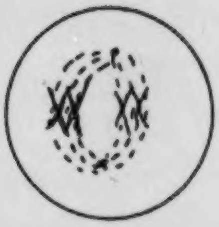
early prophase



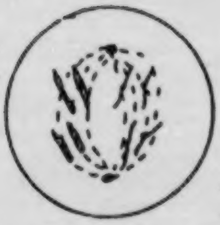
mid prophase



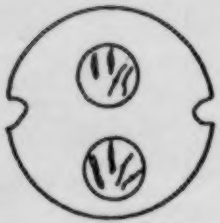
late prophase



metaphase



anaphase

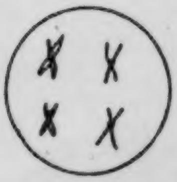


telophase

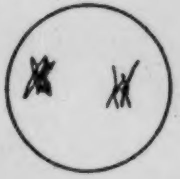
interphase -

MEIOSIS

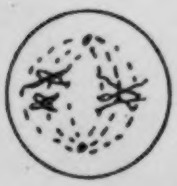
1st meiotic division
(nucleus only)



early prophase



late prophase



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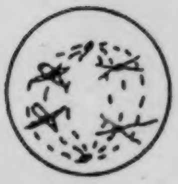

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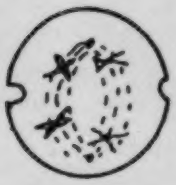
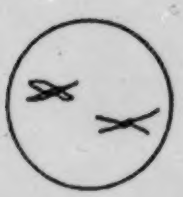
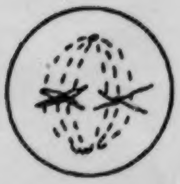


telophase

2ND MEIOTIC DIVISION



prophase



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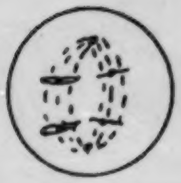

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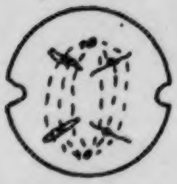
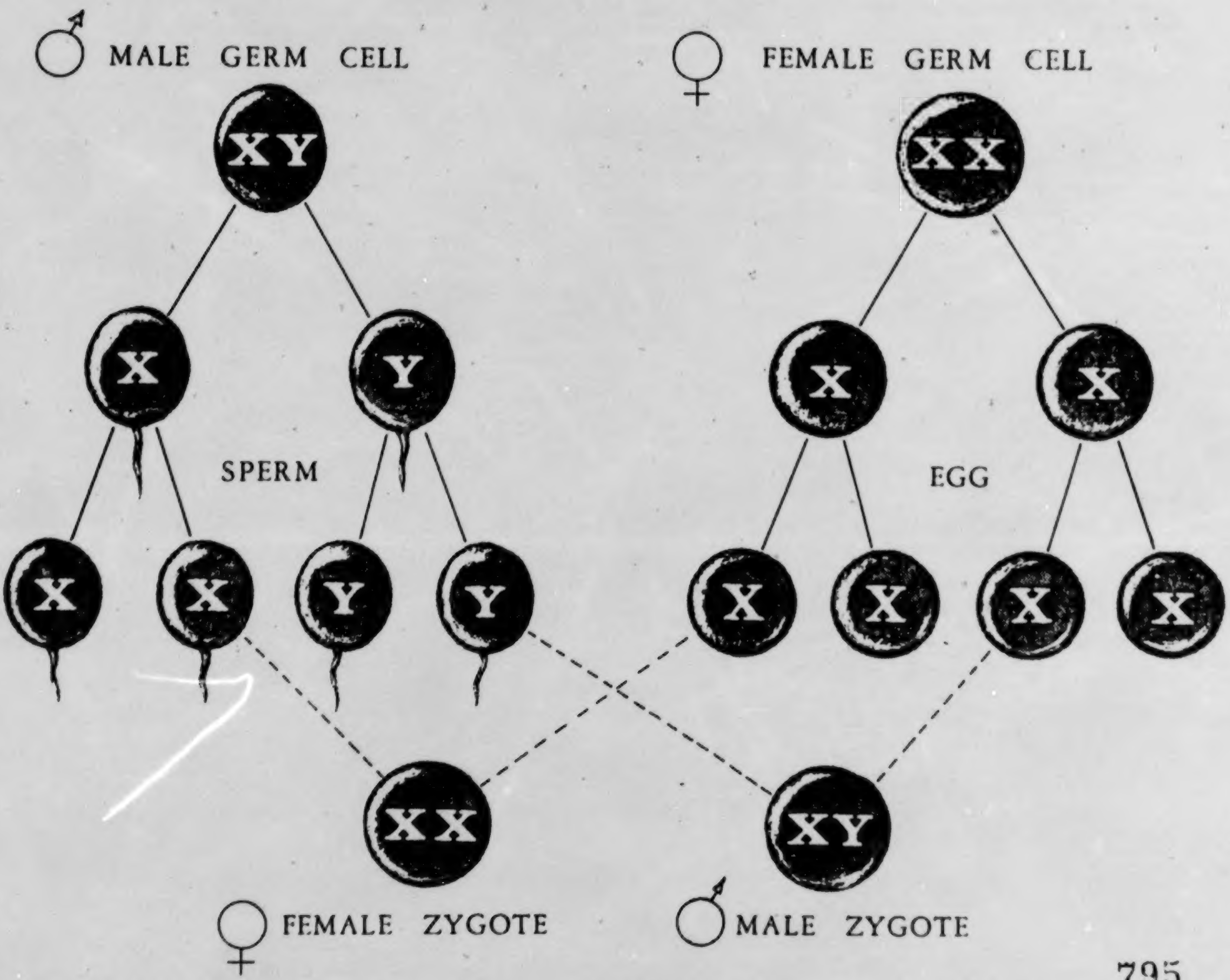


telophase

SEX DETERMINATION IN ANIMALS



♂ MALE GERM CELL

♀ FEMALE GERM CELL

SPERM

EGG

♀ FEMALE ZYGOTE

♂ MALE ZYGOTE

COLOR DETERMINATION IN SHORTHORN

♂ MALE

♀ FEMALE

	R	R
W	RW (ROAN)	RW (ROAN)
W	RW (ROAN)	RW (ROAN)

♂ MALE

♀ FEMALE

	W	W
R	RW (ROAN)	RW (ROAN)
W	WW (WHITE)	WW (WHITE)

A CROSS WITH TWO CHARACTERS

♂ MALE

♀ FEMALE

	PW	Pw	pW	pw
PW	☆ **PPWW** (POLLED, WHITEFACED)	☆ **PPWw** (POLLED, WHITEFACED)	☆ **PpWW** (POLLED, WHITEFACED)	☆ **PpWw** (POLLED, WHITEFACED)
Pw	☆ **PPWw** (POLLED, WHITEFACED)	★ **PPww** (POLLED, COLOREDFACED)	☆ **PpWw** (POLLED, WHITEFACED)	★ **Ppww** (POLLED, COLOREDFACED)
pW	☆ **PpWW** (POLLED, WHITEFACED)	☆ **PpWw** (POLLED, WHITEFACED)	✪ **ppWW** (HORNED, WHITEFACED)	✪ **ppWw** (HORNED, WHITEFACED)
pw	☆ **PpWw** (POLLED, WHITEFACED)	★ **Ppww** (POLLED, COLOREDFACED)	✪ **ppWw** (HORNED, WHITEFACED)	● **ppww** (HORNED, COLOREDFACED)

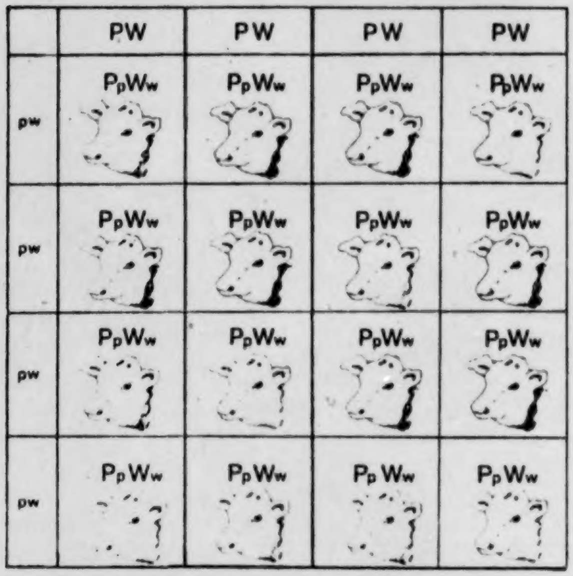
☆ — 9 POLLED, WHITEFACED

★ — 3 POLLED, COLOREDFACED

✪ — 3 HORNED, WHITEFACED

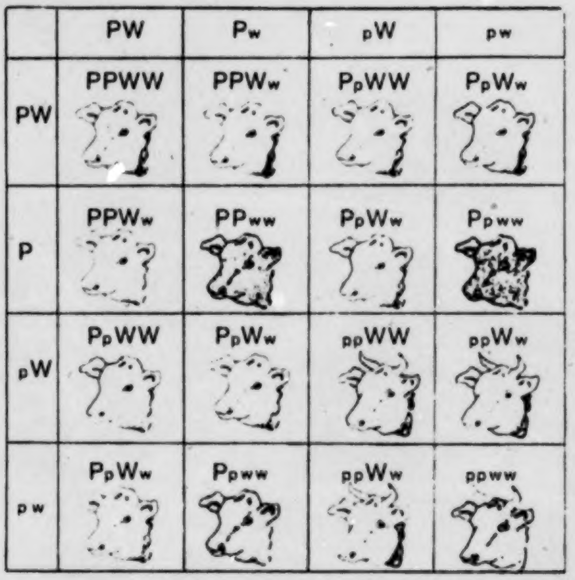
● — 1 HORNED, COLOREDFACED

IMPROVING ANIMALS THROUGH BREEDING



	PW	PW	PW	PW
pw	PpWw	PpWw	PpWw	PpWw
pw	PpWw	PpWw	PpWw	PpWw
pw	PpWw	PpWw	PpWw	PpWw
pw	PpWw	PpWw	PpWw	PpWw

A cross involving two characters--polled, whiteface (PPWW) x horned, colored face (ppww).



	PW	Pw	pW	pw
PW	PPWW	PPWw	PpWW	PpWw
P	PPWw	PPww	PpWw	Ppww
pW	PpWW	PpWw	ppWW	ppWw
pw	PpWw	Ppww	ppWw	ppww

Crosses between individuals impure for both horned and whitefaced condition (PpWw) should result in a ratio of 9 polled, whitefaced; 3 polled, colored faced; 3 horned, white faced; 1 horned, colored faced.

	BPW	BPw	BpW	Bpw	bPW	bPw	bpW	bpw
BPW	BBPPWW	BBPPWw	BBPpWW	BBPpWw	BbPPWW	BbPPWw	BbPpWW	BbPpWw
BPw	BBPPWw	BBPPww	BBPpWw	BBPpww	BbPPWw	BbPPww	BbPpWw	BbPpww
BpW	BBPpWW	BBPpWw	BBppWW	BBppWw	BbPpWW	BbPpWw	BbppWW	BbppWw
Bpw	BBPpWw	BBPpww	BBppWw	BBppww	BbPpWw	BbPpww	BbppWw	Bbppww
bPW	BbPPWW	BbPPWw	BbPpWW	BbPpWw	bbPPWW	bbPPWw	bbPpWW	bbPpWw
bPw	BbPPWw	BbPPww	BbPpWw	BbPpww	bbPPWw	bbPPww	bbPpWw	bbPpww
bpW	BbPpWW	BbPpWw	BbppWW	BbppWw	bbPpWW	bbPpWw	bbppWW	bbppWw
bpw	BbPpWw	BbPpww	BbppWw	Bbppww	bbPpWw	bbPpww	bbppWw	bbppww

27 Black, polled, white-faced

9 Red, polled, white-faced

9 Black, polled, colored-faced

9 Black, horned, white-faced

3 Red, polled, colored-faced

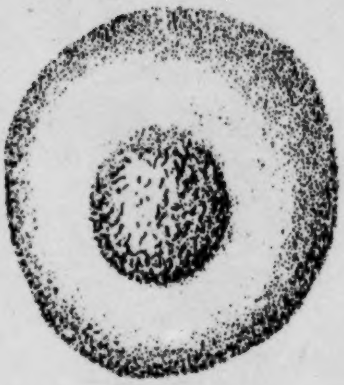
3 Red, horned, white-faced

3 Black, horned, colored-faced

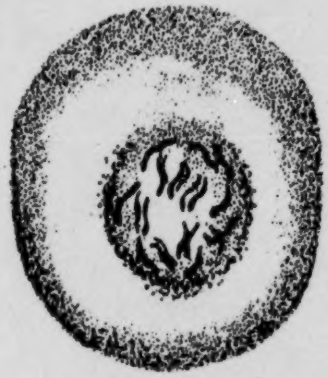
1 Red, horned, colored-faced

Descriptions and expected ratios from crosses between individuals that are heterozygous for black color, polled conditions, and white face (BbPpWw X BbPpWw).

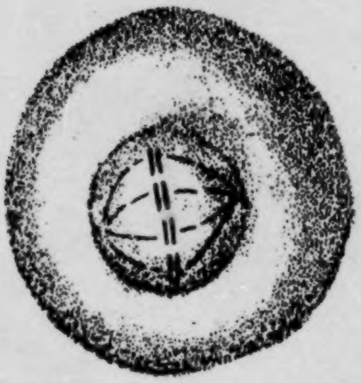
STEPS IN CELL DIVISION IN GROWTH
(MITOSIS)



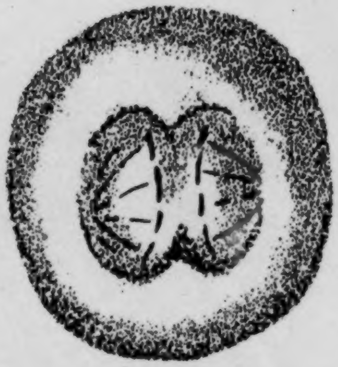
RESTING CELL



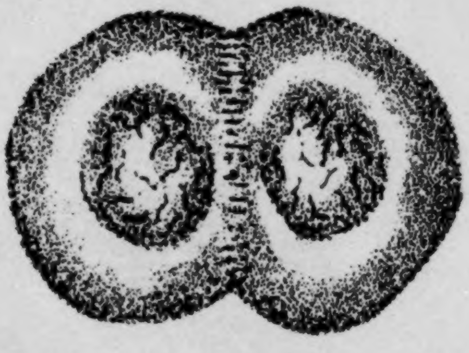
CHROMOSOMES FORMING



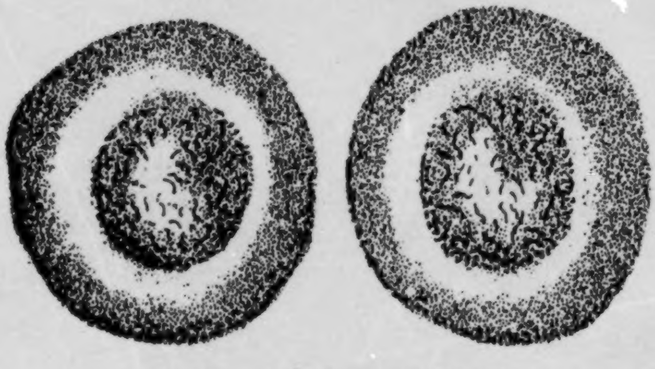
CHROMOSOMES DIVIDING



CHROMOSOMES AND NUCLEUS SEPARATING



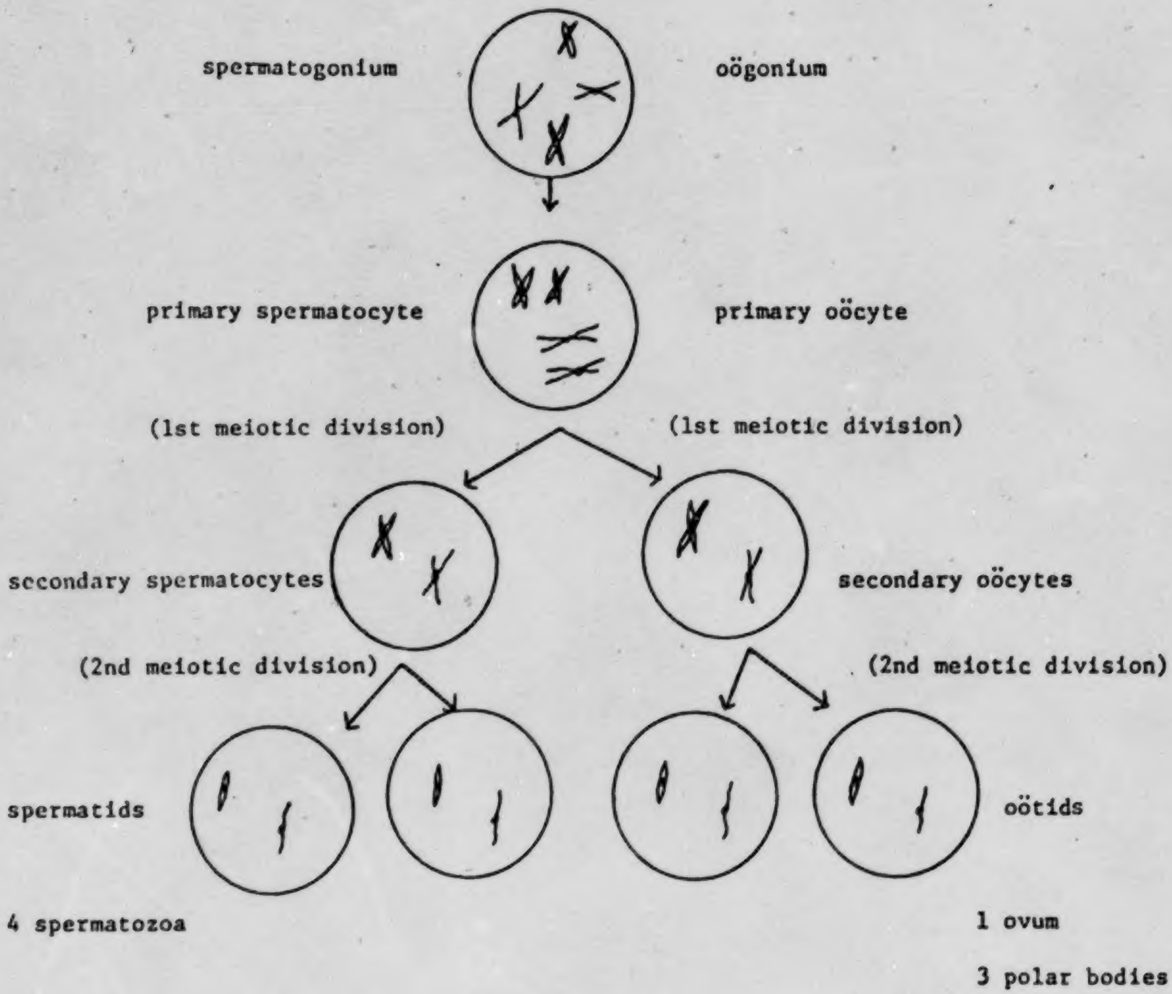
CELL DIVIDING



TWO CELLS FORMED

Vocational Agriculture Service - College of Agriculture - University of Illinois at Urbana-Champaign (Breeding 14)
From Lesson Plans for Voc. Agr. Instructors, Texas A & M University

Sketch of spermatogenesis and oögenesis:

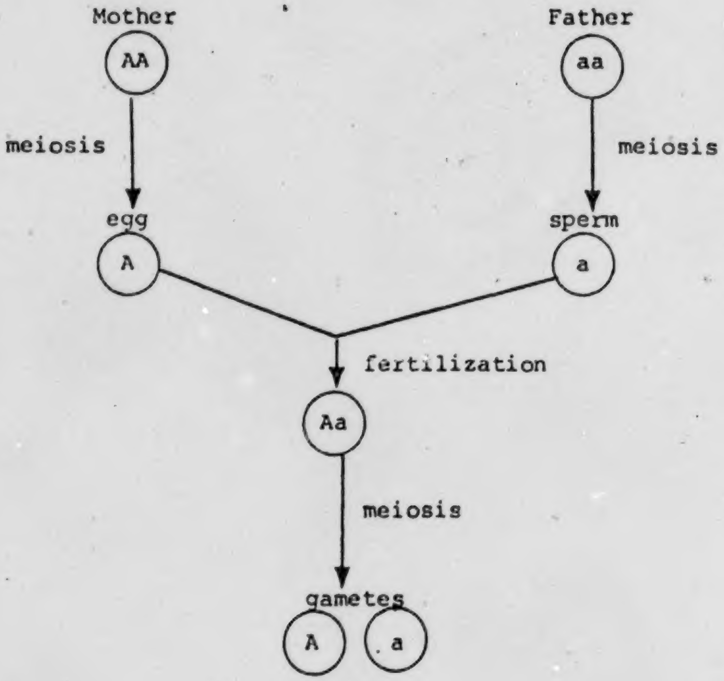


Mendel's Principles -

First principle

Principle of Segregation / separation of paired genes (allelic pairs) from one another & their distribution to different sex cells (gametes)

When an individual is formed by a union of egg and sperm, he receives corresponding genetic materials from both parents. These parental contributions separate when he in turn produces gametes; so that, for any specified piece, each gamete he produces contains either the maternal or the paternal contribution.

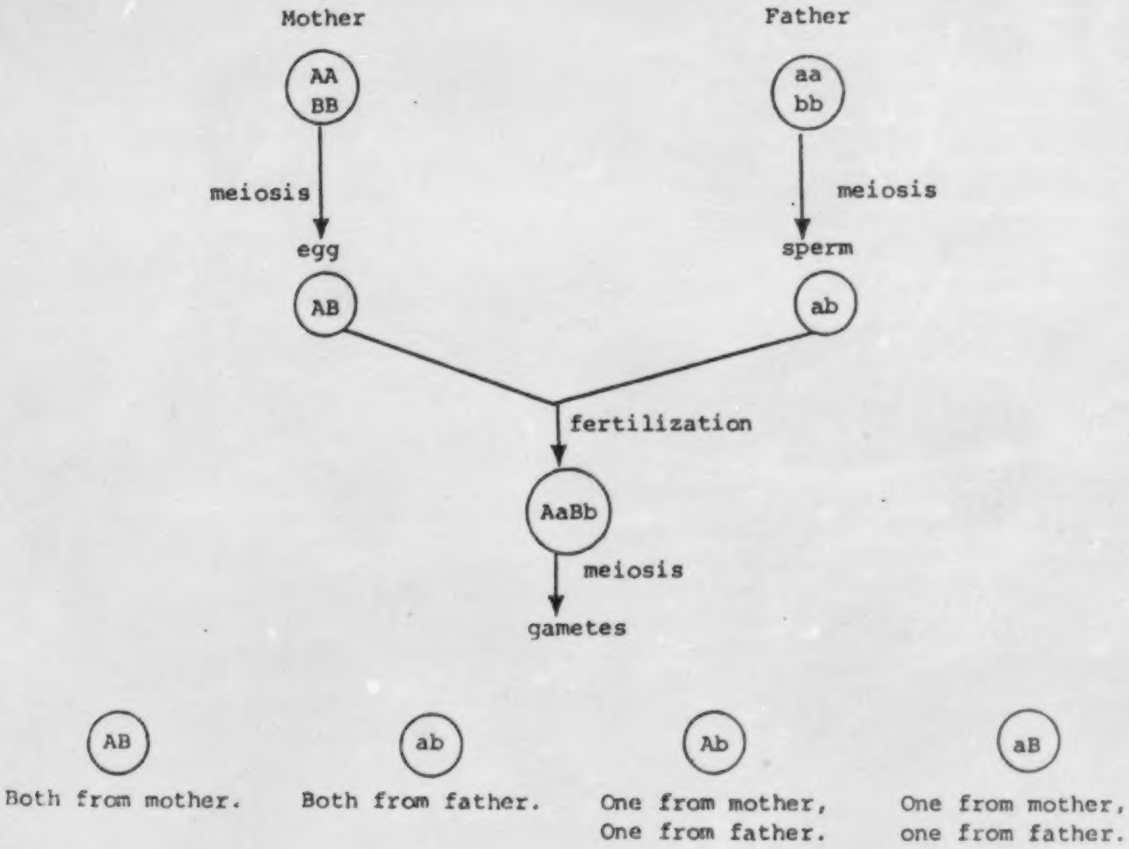


Mendel's Principles —

Second principle

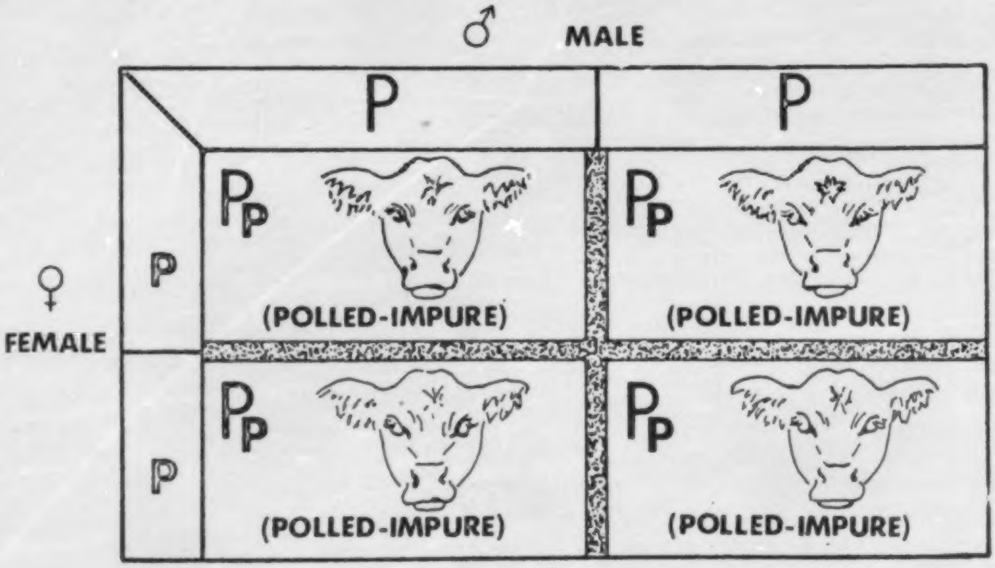
Principle of Independent Assortment

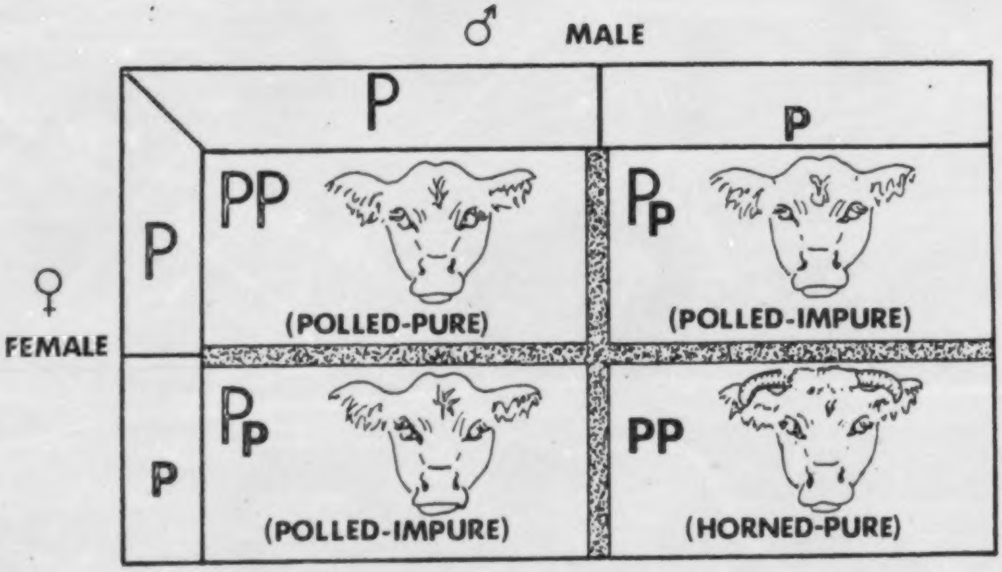
When gametes are being formed, the genetic material contributed by one parent for several traits need not remain together; rather, these materials have as much likelihood of passing into different gametes as of passing into the same one.



A DIAGRAM FOR DETERMINING THE PROBABLE RESULTS FROM A DOMINANT AND RECESSIVE CHARACTER

OK





Vocational Agriculture Service – College of Agriculture – University of Illinois at Urbana-Champaign (Breeding 18)
From Lesson Plans for Voc. Agr. Instructors, Texas A & M University

ANIMAL IMPROVEMENT

UNIT I

ASSIGNMENT SHEET #1: Frequency of Genes In a Population

The frequency of a gene refers to how rare or abundant a particular gene is in a population as compared with its own ALLELE. In most examples of genetic crosses, the frequency of the two alleles in each generation is kept equal.

For example, the cross of a red RR Shorthorn bull with white WW Shorthorn cows should give the following:

P_1	RR Red X WW White
F_1	All RW roan
F_2	1 RR 2 RW 1 WW

If there were 20 roan individuals RW in the F_1 generation, there would be a total of 40 red R and white W genes, since genes occur in PAIRS in body cells. Of the 40 genes, 20 would be red R and 20 would be white W. Thus the frequency of the red gene R would be 20/40 or 0.5, and the frequency of the white gene W would also be 20/40 or 0.5. Gene frequencies are expressed as fractions of 1.

Problem 1

Let us assume that in your herd of cattle of 100 mixed Shorthorns, 49 are red RR, 42 are roan RW, and 9 are white WW.

Calculate the frequency of the red and white genes in this herd of 100 Shorthorns

No. of animals of different colors	Genotype	Total no. of genes in herd	
		Red	White
49 red	______	_____	_____
42 roan	______	_____	_____
9 white	______	_____	_____
TOTAL 100			

Thus the frequency of the red gene R would be ______/200, or 0.____ ;

the frequency of the white gene W would be ______/______, or ______.

ANIMAL IMPROVEMENT

UNIT I

ASSIGNMENT SHEET #2: Multiple Gene Traits

Diagram and give the ratio for:

a. A cross involving two traits - polled PP and white-face WW, with horned (pp), colored-face (ww).

b. In this F_2 generation what ratio results?

ANIMAL IMPROVEMENT

UNIT I

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #1:

	No. of animals of different colors	Genotype	Total no. of genes in herd		
			Red	White	
	49 red	RR	98	0	
	42 roan	RW	42	42	
	9 white	WW	0	18	
TOTAL	100		140	60	= 200

Thus the frequency of the red gene R would be 140/200, or 0.70; the frequency of the white gene W would be 60/200 or 0.30.

Assignment Sheet #2:

a.

	PW	PW	PW	PW
pw				
pw		all offspring are PpWw		
pw				
pw				

b.

	PW	Pw	pW	pw
PW	PPWW	PPWw	PpWW	PpWw
Pw	PPWw	PPww	PpWw	Ppww
pW	PpWW	PpWw	ppWW	ppWw
pw	PpWW	PpWw	ppWW	ppWw

9 polled, white-face
3 polled, colored-face
3 horned, white-face
1 horned, colored-face

ANIMAL IMPROVEMENT

UNIT I

TEST

1. Match the following terms with their definition.

1. Chromosome
2. F_2
3. Mitosis
4. Meiosis
5. Zygote
6. Sex-influenced traits
7. Sex-limited traits
8. Sex linkage
9. Dominance
10. Recessive
11. Homozygous
12. Heterozygous
13. Phenotype
14. Genotype
15. Heterosis
16. Autosomes
17. Alleles
18. Gamete
19. Gene
20. Locus

a. A division of the body cells with the diploid (2n) number of chromosomes remaining the same.

b. A division of sex cells which possess the haploid (1n) number of chromosomes.

c. Occur in pairs and carry genes linearly along the edge.

d. The second set of progeny following the parents.

e. A gene whose phenotype expression is covered up.

f. Transmitted only from father to son.

g. Hybrid vigor

h. The actual genetic make-up

i. That appearance or performance of an animal that man determines by his senses.

j. The male or female reproductive cell.

k. Chromosomes other than sex cells.

l. Alternative form of genes, one of the other gene of the same pair.

m. A gene that covers up the expression of its allele when paired together in body cells.

n. Results from the union of the male and female gametes.

o. Expressed as dominant in male, recessive in female, i.e. scurs in cattle, horns on some sheep.

p. Expressed only by the females, i.e. milk production, egg laying.

TEST

q. Bb

r. BB or bb

s. The region of a chromosome where a particular gene is located.

t. The unit of inheritance, a portion of a DNA molecule.

2. List the three major components of genetic theory.

   a.

   b.

   c.

3. Diagram and label mitosis and spermatogenesis and oogenesis of meiosis.

TEST

4. State and illustrate Mendel's Law of segregation and recombination of genes through P, F_1 , and F_2 generations for a AA sire and aa dam.

P_1 generation AA x aa

F_1 generation Aa

F_2 generation Aa x Aa

_____ _____ _____ _____

5. Determine and diagram the probability of offspring of the four following genotypes:

AA = 0.5 x _____ = _____

Aa = _____ x 0.5 = _____

aA = _____ x _____ = 0.25 ____________

aa = _____ x _____ = _____

6. Define mutation.

7. Match non-additive expression of genes with definitions or examples.

a. Recessive
b. Dominant
c. Lack of dominance
d. Partial dominance
e. Over dominance
f. Epistasia

1. Color in collie dogs
2. Heterozygote is superior in phenotype to homozygote.
3. Compreat cattle.
4. Coat color in roan Shorthorns
5. Red Angus
6. Black Angus

TEST

8. Define additive phenotypic expression of genes.

9. Tell how a sex-linked trait is transmitted only from father to son.

10. List an example of sex-influenced traits.

11. List an example of sex-limited traits.

12. Diagram and label a cross between two individuals impure for both horned (Pp) and white faced (Ww) traits yielding a ratio of ______ polled, whitefaced; ______ polled, coloredfaced; ______horned, whitefaced; ______ horned, coloredfaced.

ANIMAL IMPROVEMENT

UNIT I

ANSWERS TO TEST

1. 1. c.
   2. d.
   3. a.
   4. b.
   5. n.
   6. o.
   7. p.
   8. f.
   9. m.
   10. e.
   11. r.
   12. q.
   13. i.
   14. h.
   15. g.
   16. k.
   17. l.
   18. j.
   19. t.
   20. s.

2. a. Cell. b. Chromosomes. c. Gene

3. Refer to transparency 4 and 5, then transparency 8 for spermatogenesis and oogenesis.

4. Mendel's law of segregation and recombination of genes states that when two genes are paired in body cells, they segregate independently of each other in the gametes, i e.

P_1 generation AA x aa

F_1 generation all Aa

F_2 generation Aa x Aa

AA aA Aa aa

5.
$$\begin{array}{l} AA = 0.5 \times 0.5 = 0.25 \\ \left.\begin{array}{l} Aa = 0.5 \times 0.5 = 0.25 \\ aA = 0.5 \times 0.5 = 0.25 \end{array}\right\rangle \underline{\quad 0.5 \quad} \\ aa = 0.5 \times 0.5 = 0.25 \end{array}$$

6. A sudden, heritable change in genetic material.

7. a. 5
   b. 6
   c. 4
   d. 3
   e. 2
   f. 1

ANSWERS TO TEST

8. The effect of one gene for a certain trait adds to the phenotypic effect of another gene, i.e. skin color.

9. In the male, there is a portion of the Y chromosomes that has no matching or counterpart in the X chromosomes which will then express itself only in the phenotype of the son.

10. Scurs in European cattle or horns in some sheep breeds.

11. Lactation in dairy cattle or egg laying in only hens.

12. Diagram - refer to transparency 13.

    Ratio of 9 polled, whitefaced; 3 polled, coloredfaced;

    3 horned, whitefaced; 1 horned, coloredfaced.

ANIMAL IMPROVEMENT

UNIT II

METHODS OF SELECTION

TERMINAL OBJECTIVE

Upon completion of this unit, the student will be able to identify, select and tell how each tool of selection will function for each of the species. This objective will be considered achieved by scoring 85 percent on the unit test.

SPECIFIC OBJECTIVES

Upon completion of this unit, the student will be able to:

1. Match selection terms with proper definitions
2. List the highest reproductive, productive, qualitative, and anatomical traits for each specie
3. List three environmental factors and discuss how they affect rate of improvement
4. List five items, and seven common aides for a livestock man doing eye appraisal of individual animals
5. List four strengths and three shortcomings of pedigrees, and three guides to pedigree evaluation
6. Arrange by declining heritability (h^2) percentage, the six traits of economic importance that a rancher looks for in his cow herd
7. Match progeny testing tools with examples or formula

ANIMAL IMPROVEMENT

UNIT II

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheet
2. Provide students with Information and Assignment Sheets
3. Assign selected pages and chapters from reference material for our of class reading
4. Make transparencies
5. Discuss Terminal and Specific Objectives with students
6. Discuss Information and Assignment Sheets with students
7. Arrange for a field trip to a bull or boar testing station
8. Give Test

Students:

1. Read Objective Sheet
2. Study Information Sheets and assigned reading
3. Complete Assignment Sheets and turn into instructor for grading
4. Participate in field trip
5. Take Test

INSTRUCTIONAL MATERIALS

Included in this Unit:

1. Objective Sheet
2. Information Sheets
3. Transparency Masters

    TM 1 - TRAITS AND THEIR LEVEL OF HERITABILITY

    TM 2 - DAIRY COW UNIFIED SCORE CARD

    TM 3 - BREED CHARACTERISTICS

INSTRUCTIONAL MATERIALS

TM 4 - SELECTION OF DAIRY BREEDING STOCK

TM 5 - EVALUATION OF BREEDING ANIMALS

TM 6 - SELECTION OF SWINE BREEDING STOCK

4. Assignment Sheets

   #1 - Bull Selection by Calculating the Breeding Value

   #2 - Calculate Selection Differential for Back Fat in Swine

   #3 - Calculation of Improvement from Selection and Heritability

   #4 - Calculate the Breeding Value

   #5 - Calculate Adjusted Weaning Weight and Yearling Weight

   #6 - Calculate Adjusted Weights for Bull Selection

   #7 - Designing Performance Testing

   #8 - Calculate Adjusted Weights for Age

   Supplemental Assignment Sheet - Adjustment Factors

5. Answers to Assignment Sheets

6. Test

7. Answers to Test

References:

Books:

1. Blakely, James. and Bade, D.H. The Science of Animal Husbandry, 2nd edition, 1979, Reston Publishing Co. Inc. Reston, Virginia.

2. Campbell, J.R. and Lasley, J.F. The Science of Animals That Serve Mankind. 2nd edition. 1975. McGraw-Hill. Inc.

Transparencies:

1. Animal Genetics and Breeding. Overhead Transparency Masters, Vocational Agriculture Service, 434 Mumford Hall, Urbana, Illinois 61801.

Score Card:

1. Dairy Cow Unified Score Card, 1971.
   The Purebred Dairy Cattle Association

ANIMAL IMPROVEMENT

UNIT II

INFORMATION SHEET

I. Terms and Definitions

   A. Breeding value (genetic value) - One half of the genetic value ability a sire or dam transmits to its offspring

   B. Correlation - A measure of how two traits tend to move together

   C. Environment - External conditions to which an animal is subjected

   D. Genetic value - Total value of all the genes an individual possesses for performance, type, or carcass quality and quantity.

   E. Generation interval - Average age of the parents when the offspring are born

   F. Heritability - Phenotypic variation that is due to inheritance

   G. Heritability estimate - Estimate of the proportion of the total phenotypic variation in a population that is due to heredity

   H. Pedigree - List of the names and numbers of the ancestors of an animal

   I. Progeny - The young, or offspring,of the parents

   J. Progeny testing - The evaluation of the genetic makeup of an individual by the appearance or performance of its progeny

   K. Sib - The brother or sister of an individual

   L. Variance - Statistical term which indicates the amount of variation within a population

II. Genetic Factors Affecting Rate of Improvement from Selection

   A. Heritability estimates (h^2) or % (TM 1, 4, and 6)

      1. Indicates the proportion of variation that is due to heredity

      2. Low = less than 30%

         Moderate = 30-50%

         High = greater than 50%

INFORMATION SHEET

III. Environmental Factors Affecting Rate of Improvement from Selection

A. Management

1. Docking of lamb tails
2. Dehorning
3. Eye appraisal selection for type and the castration of all other males

B. Nutrition

1. Grassland vs. feedlot
2. Minimum vs. maximum consumption
3. Imbalanced vs. balanced ration

C. Climate

1. Light
2. Temperature
3. Water

IV. Individual Selection

A. Eye appraisal or judging phenotype (TM 2-3)

1. Body type
2. Growth rate (average daily gain)
3. Fleece
4. Milk
5. Egg production

B. Shortcomings

1. Several traits, milk and egg production, are sex-limited traits and are expressed only by the female. Therefore, selection of breeding males cannot be based on their own performance
2. Performance records available only after sexual maturity

INFORMATION SHEET

3. With traits with low heritability, individual merit is without value

4. Overemphasized

C. Seven common aides

1. Backfat probe

   a. Gives direct reading of backfat on swine

   b. Direct measurement tool for selection

2. Ultrasonic device:

   a. Sonoray emits high frequency sound waves and records the time it takes the "echo" to bounce back from the junction of two tissues (fat and lean)

   b. Advantage is access to a high priced cut, without surgery or slaughter for selection of male breeding stock

3. $$\text{Percent of variation due to heredity} = \frac{\text{Variation due to heredity}}{\text{Variation due to environment} + \text{Variation due to heredity}} \times 100$$

4. Rate of gain - moderately to highly heritable

   $$\text{ADG (average daily gain)} = \frac{\text{pounds of gain}}{\text{number of days fed}}$$

5. $$\text{Feed efficiency} = \frac{\text{pounds of gain}}{\text{amount of feed required}}$$

   a. Very expensive to test each animal alone

   b. Seldom determined on an individual basis

6. Dairy cattle milk production

   a. Are converted to reflect a 305 day (305D) lactation, two times (2x) daily milking and mature equivalency (ME)

   b. The Standardized Lactation Record

      1. Times milked per day

      2. Length of lactation

      3. Age at calving

INFORMATION SHEET

        4. Month of calving
        5. Geographic location
        6. Breed
    7. Ratio
        a. Bull test station ratio
        b. Boar test station ratio

V. Pedigree

- A. Record of animals which are related to one individual
- B. Should include productivity of ancestors
- C. Used to select males on sex-limited traits
- D. Is valuable because each individual receives ½ of its genes from each parent
- E. Shortcomings
    1. Honesty or dishonesty of breeder
    2. Undue emphasis on remote relatives
    3. Favoritism toward progeny of favored animals
- F. Guides to pedigree evaluation
    1. Ancestor most closely related to individual should receive the breeders emphasis (parental R = 0.50, grandparental R = 0.25).
    2. Pedigree selection is more accurate when heritability of the trait is high
    3. Production or indexing of ancestors

VI. Production Testing - Selecting Animals on the basis of their Merit (TM 4, 5, and 6)

- A. Most effective when based on traits of economic importance that are highly inherited h^2-%
    1. Reproductive efficiency (% calf crop (herd basis)) 5-15
    2. Mothering ability (% weaning Rate & weaning weight) 15-25
    3. Rate of gain (daily rate gain & 205 & 365 day weights)40-55

4. Economy of gain (feed conversion or pounds of gain per pound of feed)	40-50
5. Longevity (years of age and calves per year)	10-30
6. Carcass merit (live and carcass grade, area of loin eye)	50-60
7. WDA = Weight per day of age	-

VII. Progeny Testing: Selecting Animals on the Basis of the Merit of their Offspring

- A. Selection differential
    - 1. Is the most difference between the average phenotype of the "superior" parents (P*) selected to parent the next generation and the herd average (P)
    - 2. Most genetic improvement comes from sire selection due to:
        - a. Bulls sire hundreds of progeny vs cows - 5 per lifetime
        - b. A.I.
- B. Dairy (TM 4)
    - 1. Sire indices: to estimate merit of dairy bulls based upon:
        - a. Production records of a sire's daughter compared with those of other cows in a herd
        - b. In the past included:
            - 1. daughter average
            - 2. daughter-dam difference
            - 3. equal-parent index
            - 4. daughter-contemporary herd difference
            - 5. daughter-contemporary herd index
        - c. Most sire evaluations are based on herdmate comparison or predicted difference (PD)
            - 1. Records of sire's daughter are compared with those cows (herdmate) that calve and produce milk in some herd during same season and year as the daughter of the sire being evaluated

INFORMATION SHEET

d. USDA - DHIA sire summary

1. Contains PD's for milk, fat yield and income on bulls of 6 dairy breeds

2. Free copies are available from:
Dairy Herd Improvement Investigation Unit,
Building 263, Agricultural Research Center,
U.S.D.A. , Beltsville, Maryland. 20705

2. The Estimated Average Transmitting Ability (EATA) measures the cow's ability and contribution:

a. The EATA for a dam is the best estimate of how much difference in production her daughters will show from their herdmates if sired by a breed average sire

b. Calf - the genetic production protential of a dairy calf can then be estimated by adding the PD of Sire to the EATA of the Dam. These estimates can be used to rank breeding stock

C. Beef

1. Central testing stations

a. Estimate genetic differences between herds or between sire progenies in gaining ability, grade, finishing ability, and carcass characteristics

b. Determines gaining ability, grade, and finish ability of potential sires as compared with similar animals from other herds

c. Determines gaining ability, grade, and finish ability under comparable conditions of bulls being readied for sale to commercial producers

d. Are educational tools to acquaint breeders with performance testing

2. Limits of testing stations

a. Part of the observed differences are due to pretest conditions

b. Limited use for estimating genetic differences among herds

c. Can cause problems in maintaining herd health unless precautions are taken

INFORMATION SHEET

3. On-farm testing
    - a. Decide what is to be tested and lay out experiment
        1. Use on control and one test group
        2. Accurate scales needed
    - b. Select the animals to be tested
        1. 8-12 cattle per group
        2. Divide into groups at random
    - c. Conduct the experiment
        1. All factors but one should remain constant
    - d. Keep records before, during, and after the experiment
        1. Observation notes on eating habits, temperature, etc.
        2. Feed used
        3. Animal weights before, during, and after
    - e. Measure results
        1. Daily gain
        2. Feed efficiency $\left(\frac{\text{total feed used}}{\text{total pounds gained}} \right)$
    - f. Draw conclusions
        1. Difficult if differences are small
        2. Have qualified person run statistical analysis when in doubt
        3. Size of group and individual differences affect statistical significance

4. Beef formulas (See TM 4-5)
    - a.

$$\text{205-Day weight adjusted for weaning age} = \frac{\text{actual weaning weight} - \text{Birth weight (70lbs)}}{\text{age in days when weaning weight is obtained}} \times 205 + \text{birth weight}$$

b.

$$\text{Adjusted 365-day weight} = \frac{\text{Actual final weight} - \text{Actual weaning weight}}{\text{Number of days between weaning and final weight}} \times 160 + \text{205-day weight adjusted for weaning age + age of dam}$$

c. Age of dam adjustment factor:

Age of dam in years	Factor
2	1.15
3	1.10
4	1.05
5 - 10	1.00
11+	1.05

d. Sex adjustment

Sex	Factor
Bull	.95
Steer	1.00
Heifer	1.05

e. $$\text{Dressing percent} = \frac{\text{Carcass weight}}{\text{Live weight}} \times 100$$

f. Most Probable Producing Ability (MPPA)

D. Swine

1. Central test program

   a. Operated by state or regional support in combination with partial or complete financial support by the participating breeders

   b. Advantages

      1. Animals can be tested under standardized conditions of feeding, housing, and management

      2. Close daily unbiased supervision is available

   c. Disadvantages

      1. Limited facilities permit the sampling and testing of only an extremely small percentage of the total swine population

      2. Congregation of animals from many farms presents the danger of spread of infectious diseases and parasites

INFORMATION SHEET

3. Test environment may be quite different from the normal environment under which animals are produced
4. Sample of pigs from each farm is too small to reflect differences between farms accurately
5. Pretest environment is different for pigs from different farms

2. On-farm testing
   - a. Avoids some of the problems of central test stations
   - b. Usually administered and partially financed by state and local extension services, but facilities are provided by the participating breeder
   - c. Breed organizations have on-farm testing programs for production registry

3. Kansas on-farm testing
   - a. Requirements
     1. Breeders furnish own scales
     2. SPF breeders furnish restraining crate
     3. 110-volt power
     4. Temperature above 40°F in winter and cool during the summer
     5. Hogs weigh between 190 and 250 lbs
   - b. KSU provides Scanogram machine
     1. Determines backfat thickness-readings over shoulder, loin and hip
     2. Determines loin eye area - requires 20 seconds and taken at 10th rib (4" forward of the center probe mark)
   - c. Using the data
     1. Purebred breeders can use the data in selecting replacement gilts, and selling boars and gilts
     2. Commercial producers can use the data in buying boars and gilts

INFORMATION SHEET

4. Traits important in performance testing
    a. Sow productivity
        1. Conception rate
        2. Interval between litters
        3. Ability to wean large number of pigs at a heavy weight
    b. Growth
        1. Weight per day of age
        2. $\frac{\text{Weight}}{\text{Age}}$ = less than 1.5
    c. Carcass traits
        1. Backfat thickness important here
5. Certification requirements
    a. Production Registry litter requirements
        1. Litter size of at least 8 live pigs at 3 or 5 weeks of age
        2. Litter weaning weight of at least 48 kg. total at 3 weeks of age
    b. Certified litter requirements
        1. Each of 2 pigs from Production Registry litter must:
            a. Be 220 lbs at 180 days
            b. Have less than 1.5" of backfat
            c. Be over 29" long
            d. Have over 4½ sq. ins. loin eye area
    c. Certified meat sire
        1. Boar sires 5 certified litters of which no more than two dams are related
    d. Certified mating
        1. Repeat mating of a boar and sow that have previously produced a certified litter

INFORMATION SHEET

- e. Superior meat sire
  - 1. Progeny-type test
  - 2. Take 15 pigs representative of 5 litters (male and/or female pigs)
  - 3. Start test at 40-60 lbs pig weight
  - 4. Feed out as a group
  - 5. At 220 lbs, the pig must:
    - a. All meet 220 lbs in 175 days
    - b. Have feed conversion of less than 300 lbs/100 lbs gain
    - c. Twelve of the fifteen, when slaughtered, must average:
      - i. $29\,^3/_4$" long
      - ii. Less than 1.4" backfat
      - iii. More than 4.75 sq. in. loin eye area
    - d. Index = 300 - (days to 220lbs) - (Adjusted probe x 50)
    - e. Carcass evaluation of littermates
    - f. 21 day litter weight

- E. Sheep (See TM6)
  - 1. Adjusted 120 day standard. Adjustments are made for:
    - a. Age of lamb
    - b. Single or multiple birth and/or rearing
    - c. Sex of lamb
    - d. Age of dam
    - e. Formula for age of lamb adjustment

$$\text{120 day weight} = \frac{\text{Actual weight}}{\text{Days of age}} \times 120$$

INFORMATION SHEET

2. Visual selection

3. Carcass evaluation of progeny

a.	Slaughter lamb weights	95-105 lbs
b.	Daily gain	.71 lbs
c.	Feed efficiency	6.01 lbs feed/lb gain
d.	Carcass weight	50-55 lbs
e.	Dressing percentage	52%
f.	Backfat	.12 inches
g.	Loin eye area	2.4 sq. inches
h.	Leg Score	14
i.	Kidney knob	3.5%
j.	Yield grade	2.5
k.	Quality grade	choice
l.	USDA Cutability score	1 is best, 5 is the poorest

1-5

OK

TRAITS AND THEIR LEVEL OF HERITABILITY

TRAIT	LEVEL OF HERITABILITY
REPRODUCTIVE PERFORMANCE....	LOW to MODERATE
WEANING WEIGHT..................	MODERATE
COW MATERNAL ABILITY..........	MODERATE
FEEDLOT GAIN......................	MODERATE+
CARCASS GRADE	MODERATE+
FEED EFFICIENCY..................	MODERATE+
RIBEYE AREA.........................	HIGH+
TENDERNESS.........................	HIGH
FAT THICKNESS....................	MODERATE
CARCASS YIELD.....................	MODERATE
YIELD OF RETAIL CUTS	MODERATE
CANCER EYE SUSCEPTIBILITY.....	MODERATE
EYE LID PIGMENTATION...........	HIGH

LOW=less than 30%

MODERATE=30-50% HIGH=greater than 50%

Vocational Agriculture Service – College of Agriculture – University of Illinois at Urbana-Champaign (Breeding 24)
From Lesson Plans for Voc. Agr. Instructors, Texas A & M University

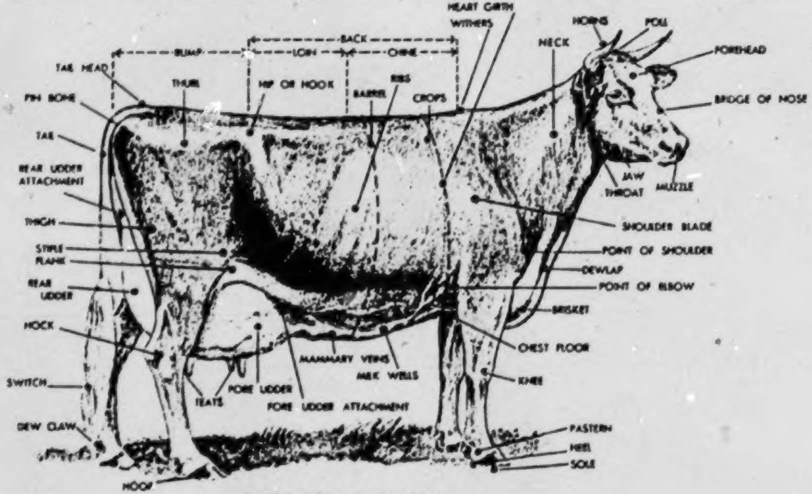
4
2

DAIRY COW UNIFIED SCORE CARD

Copyrighted by The Purebred Dairy Cattle Association, 1943. Revised, and Copyrighted 1957 and 1971
Approved – The American Dairy Science Association, 1957

Breed characteristics should be considered in the application of this score card		Perfect Score
Order of observation		
1. GENERAL APPEARANCE		**30**
(Attractive individuality with, feminity, vigor, stretch, scale, harmonious blending of all parts, and impressive style and carriage. All parts of a cow should be considered in evaluating a cow's general appearance)	10	
BREED CHARACTERISTICS — (see reverse side) **HEAD** — clean cut, proportionate to body; broad muzzle with large, open nostrils; strong jaws; large, bright eyes; forehead, broad and moderately dished; bridge of nose straight; ears medium size and alertly carried		
SHOULDER BLADES — set smoothly and tightly against the body **BACK** — straight and strong; loin, broad and nearly level **RUMP** — long, wide and nearly level from **HOOK BONES** to **PIN BONES**; clean cut and free from patchiness; **THURLS**, high and wide apart; **TAIL HEAD**, set level with backline and free from coarseness; **TAIL**, slender	10	
LEGS AND FEET — bone flat and strong, pasterns short and strong, hocks cleanly moulded. **FEET**, short, compact and well rounded with deep heel and level sole. **FORE LEGS**, medium in length, straight, wide apart, and squarely placed. **HIND LEGS**, nearly perpendicular from hock to pastern, from the side view, and straight from the rear view	10	
2. DAIRY CHARACTER		**20**
(Evidence of milking ability, angularity, and general openness, without weakness; freedom from coarseness, giving due regard to period of lactation)		
NECK — long, lean, and blending smoothly into shoulders; clean cut throat, dewlap, and brisket **WITHERS**, sharp. **RIBS**, wide apart, rib bones wide, flat, and long. **FLANKS**, deep and refined. **THIGHS**, incurving to flat, and wide apart from the rear view, providing ample room for the udder and its rear attachment. **SKIN**, loose, and pliable	20	
3. BODY CAPACITY		**20**
(Relatively large in proportion to size of animal, providing ample capacity, strength, and vigor)		
BARREL — strongly supported, long and deep; ribs highly and widely sprung; depth and width of barrel tending to increase toward rear	10	
HEART GIRTH — large and deep, with well sprung fore ribs blending into the shoulders; full crops; full at elbows; wide chest floor	10	
4. MAMMARY SYSTEM		**30**
(A strongly attached, well balanced, capacious udder of fine texture indicating heavy production and a long period of usefulness)		
UDDER — symmetrical, moderately long, wide and deep, strongly attached, showing moderate cleavage between halves, no quartering on sides; soft, pliable, and well collapsed after milking; quarters evenly balanced	10	
FORE UDDER — moderate length, uniform width from front to rear and strongly attached	6	
REAR UDDER — high, wide, slightly rounded, fairly uniform width from top to floor, and strongly attached	7	
TEATS — uniform size, of medium length and diameter, cylindrical, squarely placed under each quarter, plumb, and well spaced from side and rear views	5	
MAMMARY VEINS — large, long, tortuous, branching	2	
"Because of the natural undeveloped mammary system in heifer calves and yearlings, less emphasis is placed on mammary system and more on general appearance, dairy character, and body capacity. A slight to serious discrimination applies to overdeveloped, fatty udders in heifer calves and yearlings."		
Subscores are not used in breed type classification. **TOTAL**		**100**

OK



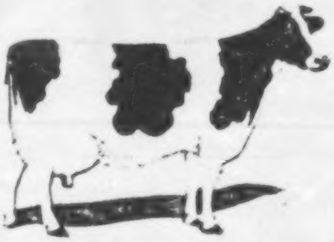
PARTS OF A DAIRY COW

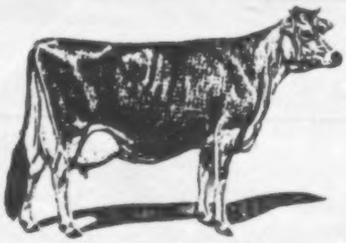
#3
OK

IDEAL AYRSHIRE COW

IDEAL BROWN-SWISS COW

IDEAL GUERNSEY COW


IDEAL HOLSTEIN-FRIESIAN COW


IDEAL JERSEY COW

BREED CHARACTERISTICS

AYRSHIRE

Strong and robust, showing constitution and vigor, symmetry, style and balance throughout, and characterized by strongly attached, evenly balanced, well-shaped udder.

COLOR—Light to deep cherry red, mahogany, brown, or a combination of any of these colors with white, or white alone, distinctive red and white markings preferred, black or brindle objectionable.

SIZE—A mature cow in milk should weigh at least 1200 lbs.

HORNS—Inclining upward, refined, medium length and tapered toward tips. No discrimination for absence of horns.

GUERNSEY

Size and strength, with quality and character desired.

COLOR—A shade of fawn with white markings clearly defined. Skin should show golden yellow pigmentation. When other points are equal, a clear (buff) muzzle will be favored over a smoky or black muzzle. A bright golden yellow pigmentation on the nose, around the eyes, in the ears, in the escutcheon, around the udder and at the point of tail is favored. Two of the 10 points under General Appearance are to be allotted to yellow skin secretion.

SIZE—A mature cow in milk should weigh at least 1100 lbs. "In milk" means normal condition after having been in milk from 3 to 6 months.

HORNS—No discrimination for absence of horns.

JERSEY

Sharpness with strength indicating productive efficiency.

COLOR—A shade of fawn, with or without white markings.

SIZE—A mature cow in milk should weigh about 1000 lbs.

HORNS—No discrimination for absence of horns.

BROWN SWISS

Strong and vigorous, but not coarse. Size and ruggedness with quality desired. Extreme refinement undesirable.

COLOR—Solid brown varying from very light to dark. White or off-color spots objectionable. Females with any white or off-color markings above the underside of the belly or with white core in switch do not meet color standards of the Brown Swiss breed, and shall be so designated when registered. Pink noses and light streaks up the side of the face objectionable.

SIZE—The minimum weight for mature cows should be about 1500 lbs.

HORNS—No discrimination for absence of horns.

HOLSTEIN

Rugged, feminine qualities in an alert cow possessing Holstein size and vigor.

COLOR—Black and white or red and white markings clearly defined.

SIZE—A mature cow in milk should weigh a minimum of 1500 lbs.

HORNS—No discrimination for absence of horns.

EVALUATION OF DEFECTS

In a show ring, disqualification means that the animal is not eligible to win a prize. Any disqualified animal is not eligible to be shown in the group classes. In slight to serious discrimination, the degree of seriousness shall be determined by the judge.

EYES
1. Total blindness: *Disqualification.*
2. Blindness in one eye: *Slight discrimination.*
3. Cross-eyes: *Slight discrimination.*

WRY FACE
Slight to serious discrimination.

CROPPED EARS
Slight discrimination.

PARROT JAW
Slight to serious discrimination.

SHOULDERS
Winged: *Slight to serious discrimination.*

TAIL SETTING
Wry tail or other abnormal tail settings: *Slight to serious discrimination.*

LEGS AND FEET
1. Lameness — apparently permanent and interfering with normal function: *Disqualification.*
   — apparently temporary and not affecting normal function: *Slight discrimination.*
2. Bucked knees: *Slight to serious discrimination.*
3. Evidence of arthritis, crampy hind leg: *Serious discrimination.*
4. Evidence of fluid in hocks: *Slight to serious discrimination.*

ABSENCE OF HORNS
No discrimination.

LACK OF SIZE
Slight to serious discrimination.

UDDER
1. Blind quarter: *Disqualification.*
2. Abnormal milk (bloody, clotted, watery): *Possible disqualification.*
3. Udder definitely broken away in attachment: *Serious discrimination.*
4. A weak udder attachment: *Slight to serious discrimination.*
5. One or more light quarters, hard spots in udder, obstruction in teat (spider): *Slight to serious discrimination.*
6. Side leak: *Slight discrimination.*

DRY COWS
Among cows of apparently equal merit: *Give strong preference to cows in milk.*

FREEMARTIN HEIFERS
Disqualification unless proved pregnant.

OVERCONDITIONED
Slight to serious discrimination.

TEMPORARY OR MINOR INJURIES
Blemishes or injuries of a temporary character not affecting animal's usefulness: *Slight discrimination.*

EVIDENCE OF SHARP PRACTICE
1. Animals showing signs of having been operated upon or tampered with for the purpose of concealing faults in conformation, or with intent to deceive relative to the animal's soundness: *Disqualification.*
2. Uncalved heifers showing evidence of having been milked: *Serious discrimination.*

~~18~~
4

Selection of Dairy Breeding Stock

Trait	Current average[a]	Goal	h^2 (%)
Reproductive			
birth weight, lb	50-95	50-95	35-50
calving interval, mo	13.1	12	0-15
mortality (birth to calving), %	15	5	0-10
longevity, number lactations	3.5	6	10-30
Productive			
milk yield, lb per lactation	10,300	10 x body weight	20-40
persistency of lactation, %	92	95	20-40
Qualitative			
milk fat, %	3.8	b	50-70
milk solids not fat, %	8.7	b	40-70
Anatomical			
type score	79	c	20-30

Selection of Beef Breeding Stock

Trait	Current average	Goal	h^2 (%)
Reproductive			
birth weight, lb	70-80	70-80	5-15
percent calf crop (herd basis), %	75	95	5-15
Productive			
milk yield per day, lb	10-20	15-25	20-30
weaning weight, lb	375	500	15-25
post-weaning daily gain, lb	2.0	3.0	50-55
feed efficiency, lb feed/lb gain	7.0	5.8	40-50
yearling weight, lb	800	1000	40-50
Qualitative			
carcass weight per day of age, lb	1.1	1.6	40-50
backfat thickness, in	.8	.6	40-50
backfat thickness/cwt, in	.13	.10	40-50
loin eye area, sq in	10	12	50-60
loin eye area/cwt, sq in	1.67	2.00	50-60
yield grade	3.5	2.0	50-60
quality grade	Choice$^-$	Choice	50-60

Breed and identification	Birth		Weaning			Age of dam	Adjusted[a] 205-day weight	Post-weaning average daily gain	Adjusted 365-day weight	Ranking		
	date	weight	date	age	weight					records	visual	overall

[a] Adjusted 205-day weight for weaning age and age of dam.

Calculations:

Selection of Swine Breeding Stock

Trait	Current average	Goal	h^2 (%)
Reproductive			
litter size at birth	9.5	12	10-20
litter size at weaning	7.3	10	10-15
Productive			
litter weight at weaning (30 days), lb	130	150	15-20
post-weaning daily gain, lb	1.3	1.6	25-35
feed efficiency, lb feed/lb gain	4.0	3.1	25-35
Qualitative			
backfat thickness, in	1.7	1.0	45-55
loin eye area, sq in	4.2	5.0	45-55
carcass length, in	30.0	31.0	55-65
Anatomical			
number of nipples	12	14	65-80

Selection of Sheep Breeding Stock

Trait	Current average	Goal	h^2(%)
Reproductive			
birth weight, lb	8-10	8-10	15-30
lambing percent (flock basis), %	95	150	5-15
Productive			
post-weaning daily gain, lb	.5	.7	30-40
feed efficiency, lb feed/lb gain	7.4	6.0	30-40
120-day weight, lb	80	100	30-40
Qualitative			
backfat thickness, in	.25	.12	50-60
loin eye area, sq in	2.2	2.4	35-50
yield grade	3.5	2.5	50-60
quality grade	Choice	Choice	10-15

ANIMAL IMPROVEMENT

UNIT II

ASSIGNMENT SHEET #1: Bull Selection by Calculating the Breeding Value

Before buying two bulls you want to compare the two bulls A and B for weaning weights. Bull A's production record said he had a weaning weight of 630 lbs in a herd that averaged 550 lbs. Since the heritability of the weaning weight is 0.30, the breeding value of Bull A for weaning weights is:

a. = Heritability % x (Ind. weaning wt - herd average)

=

b. However, since each parent only contributes one half of the genes in calf, a parent only transmits one half of its breeding value. Therefore, your Bull A's calves can really be expected to be ___________ pounds above herd average.

c. Now Bull B. His individual weaning weight is 630 lbs in a herd that averages 570 lbs. What is Bull B's breeding value for weaning weights?

____

d. Therefore, Bull B's calves can be expected to be ________________ lbs above herd average

e. Which bull will you buy and why?

ANIMAL IMPROVEMENT

UNIT II

ASSIGNMENT SHEET #2: Calculate Selection Differential for Backfat in Swine

What is the selection differential for back fat for this combination:

Sire: 1.0 inches back fat
Dam: 1.3 inches back fat

when: herd females: 1.8 inches back fat
herd males: 1.2 inches back fat
herd average: 1.4 inches back fat

ANIMAL IMPROVEMENT

UNIT II

ASSIGNMENT SHEET #3: Calculation of Improvement from Selection and Heritability

The weaning weights of 10 selected heifers from your herd average 440 lbs., and your herd averages 420 lbs. They were mated to a bull of the same breed which weighed 540 lbs in a herd where the average was 460 lbs. Assume the heritability of weaning weight is 30%.

Selection differential (reach) for the heifers was

Section differential for the parents of the next calf crop is

Improvement resulting from selection and heritability is

The resulting calf crop will average ? lbs?

ANIMAL IMPROVEMENT

UNIT II

ASSIGNMENT SHEET #4: Calculate the Breeding Value

If your bull has predicted difference (PD) of 800 lbs. and your dairy cow has an EATA of 400 lbs., what is the breeding value, or productivity index?

ANIMAL IMPROVEMENT

UNIT II

ASSIGNMENT SHEET #5: Calculate Adjusted Weaning Weight and Yearling Weight

This data is to be used for the following five questions.

A bull calf out of a 3 yr. old cow had a birth weight of 65 lbs., a weaning weight of 461 lbs, at 220 days of age, and a yearling weight of 835 lbs. at 390 days of age.

Age of dam	Factor	Sex	Factor
2 yrs	1.15	Bull	.95
3	1.10	Steer	1.00
4	1.05	Heifer	1.05
5-10	1.00		
11 & over	1.05		

(please show all of your work)

a. What is the preweaning ADG?

b. What is the calf's weaning weight (adjusted for age of calf)?

c. What is the calf's weaning weight (adjusted for all factors)?

d. What is the post weaning ADG?

e. What is the calf's yearling weight (adjusted for all factors)?

ANIMAL IMPROVEMENT

UNIT II

ASSIGNMENT SHEET #6: Calculate Adjusted Weights for Bull Selection

Suppose your new Marchigiana bull calf was born to a three-year-old cow, his weight was 65 pounds at birth and 609 pounds at weaning at 200 days of age. The 205-day weaning weight for your new prize bull calf would be:

(Please show all of your work)

a. $$\text{205-day weight} = \frac{\text{actual weaning wt} - \text{Birth wt}}{\text{age of calf in days}} \times 205 + \text{Birth weight}$$

b. and to adjust to a mature dam basis your bull calf's 205 adjusted weaning weight = ________________.

Age of cows	Add to 205-day weaning weights (pounds) male	female
2	60	54
3	40	36
4	20	18
5 - 10	0	0
11 +	20	18

c. Suppose you put your bull on test for 140 days and weighted off test at 1169 pounds. The adjusted yearling weights for your bull would be:

$$\text{Adj. 365-day wt.} = \frac{\text{Final wt.} - \text{actual weaning wt}}{\text{number of days between weight}} \times 160 + \text{205 adj. weaning weight}$$

ANIMAL IMPROVEMENT

UNIT II

ASSIGNMENT SHEET #7: Designing Performance Testing

Outline below an on-farm test to compare post-weaning rate of weight gain for two different crosses of hogs. One group is a Duroc-Yorkshire cross and the other is a Berkshire-Yorkshire cross. Tell what conditions will be the same for both groups and what conditions will be different.

ANIMAL IMPROVEMENT

UNIT II

ASSIGNMENT SHEET #8: Calculate Adjusted Weights for Age

Refer to accompanying sheet on adjustment factors

a. A wether, single from a 5-year-old ewe weighing 90 pounds at 90 days of age:

Fully adjusted 120-day weight is ____________________

b. Ram lamb triplet, raised as triplet from 1 yr. old ewe weighing 80 pounds at 90 days of age:

Fully adjusted 120-day weight is ________________.

c. Ewe lamb triplet raised as a twin from 2 yr old dam at 78 pounds at 90 days of age:

Fully adjusted 120-day weight is _________________

d. Rank these three lambs according to their fully adjusted 120-day weight.

(Please show all of your work)

ANIMAL IMPROVEMENT

UNIT II

SUPPLEMENTAL ASSIGNMENT SHEET

Adjustment factors

	Age of dam		
	3 to 6 yrs.old	2 yrs. old or over 6 yrs. old	1 yr. old
Ewe lamb			
Single	1.00	1.09	1.22
Twin - raised as twin	1.11	1.20	1.33
Twin - raised as single	1.05	1.14	1.28
Triplet - raised as triplet	1.22	1.33	1.46
Triplet - raised as twin	1.17	1.28	1.42
Triplet - raised as single	1.11	1.21	1.36
Wether			
Single	.97	1.06	1.19
Twin - raised as twin	1.08	1.17	1.30
Twin - raised as single	1.02	1.11	1.25
Triplet - raised as triplet	1.19	1.30	1.43
Triplet - raised as twin	1.14	1.25	1.39
Triplet - raised as single	1.08	1.18	1.33
Ram lamb			
Single	.89	.98	1.11
Twin - raised as twin	1.00	1.09	1.22
Twin - raised as single	.94	1.03	1.17
Triplet - raised as triplet	1.11	1.22	1.35
Triplet - raised as twin	1.06	1.17	1.31
Triplet - raised as single	1.00	1.10	1.25

ANIMAL IMPROVEMENT

UNIT II

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #1:

a. = Heritability % x (Ind. weaning wt - herd average)

= (.30)(630-550)
= (.30)(80)
= 24 pounds

b. 24 ÷ 2 = 12 pounds

c. (.30) (630-570)
= (.30) (60)
= 18 pounds

d. 18/2 = 9 pounds

e. Bull A = Ind. breeding value for weaning wts. 24 lbs
= His calves will weigh 12 lbs. above average

Assignment Sheet #2:

Selection differential = average phenotype for "superior" parents (P*) - their herd average (P)

$$S = \frac{P^* - P}{2} \text{ (½ from each parent)}$$

$$\begin{aligned} S &= 1.0 - 1.4 = -.4 \\ &\ 1.3 - 1.4 = \underline{-.1} \\ &\ -.5/2 = -0.25 \text{ inches} \end{aligned}$$

Assignment Sheet #3:

Bull

$540\text{-}460 = 80 \times .30 = \frac{24}{2} = 12$

+

Heifers

$440\text{-}420 = 20 \times .30 = \frac{6}{2} = \underline{3}$

15 lbs.

Herd average = 420 + 15 lbs = 435 lbs.

ANIMAL IMPROVEMENT

UNIT II

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #4:

PD = +800 lbs
EATA = 400 lbs
Breeding value or Productivity index = 1200 lbs

Assignment Sheet #5:

a. Preweaning ADG $= \frac{\text{weaning wt. - Birth wt}}{\text{days at weaning}}$

$= \frac{461\# - 65\#}{220}$

$= 1.8\#/\text{day}$

b. Adjusted 205 day weight for weaning calf $= \frac{\text{weight - birth wt.}}{\text{age in days when weaning is obtained}} \times 205 + \text{Birth wt.}$

$= 1.8 \text{ lbs/day} \times 205 + 65 \text{ lbs}$

$= 369 \text{ lbs} + 65 = 434 \text{ lbs.}$

c. Adjusted 205-day weight adjusted for age of dam and sex
Factor for Dam = 434 lbs x 1.10 = 477.40 lbs
Factor for sex = 477.4 lbs x 454 lbs.

d. Post-weaning ADG $= \frac{\overset{\text{Actual}}{\text{Yearling wt.}} - \overset{\text{Actual}}{\text{weaning wt.}}}{\text{Number of days between weaning wt. and final wt.}}$

$= \frac{835 \text{ lbs} - 461 \text{ lbs}}{390 \text{ days} - 220 \text{ days}} = \frac{374 \text{ lbs}}{170 \text{ days}}$

$= 2.2 \text{ lbs/day}$

e. Adjusted 365-day wt. = Post weaning ADG x 160 + 205-day wt. adjusted for weaning age, sex, and age of dam

= 2.2 x 160 + 454 lbs
= 352.0 lbs + 454
= 806 lbs.

ANIMAL IMPROVEMENT

UNIT II

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #6:

a. 205-day wt. $= \left(\frac{609 - 65}{200} \times 205\right) + 65$

$= (2.72 \times 205) + 65 = 557.6 + 65 = 622.6$ lbs

b.

Age of cows	Add to 205-day weaning weights (pounds)	
	male	female
2	60	54
3	40	36
4	20	18
5 - 10	0	0
11 +	20	18

205-day adjusted weaning wt. = 622.6 lb + 40 = 662.6 lbs

c. Adj. 365-day wt. $= \frac{\text{Final wt. - actual weaning wt.}}{\text{number of day between weight}} \times 160 + \text{205 adj. weaning weight}$

$\left(\frac{1169 - 609}{400} \times 160\right) + 662.6$ lbs

$= 640 + 662.6$ lbs

Adjusted 365-day wt. = 1302.6 lbs

Assignment Sheet #7:

Complete to satisfaction of the instructor

ANIMAL IMPROVEMENT

UNIT II

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #8:

a. $\frac{90\text{ lbs}}{90\text{ days}}$ = 1 lb/day x 120 = (120 lbs)(.97) Factor for wether - single - 5 year old dam
= 116.4 lbs

b. $\frac{80}{90}$ = .89 lb/day x 120 = (106.716)(1.35) Factor for Ram (T/T) 1 yr. dam
= 144 lbs

c. $\frac{78}{80}$ = .867 lb/day x 120 = (104)(1.28)
= 133.1 lbs

d. b = 144 lbs. c = 133.1 lbs. a = 116.4 lbs

ANIMAL IMPROVEMENT

UNIT II

TEST

1. Match the following terms with their definition.

   a. Breeding value
   b. Correlation
   c. Environment
   d. Genetic value
   e. Generation interval
   f. Heritability
   g. Heritability Estimate
   h. Pedigree
   i. Progeny
   j. Progeny testing

   1. List of ancestors
   2. Young, offspring
   3. Measure of how two tracts tend to move together
   4. One half of genetic value ability a sire gives to offspring
   5. Age of parents when offspring are born
   6. External conditions
   7. Variation due to inheritance
   8. Total value of all genes
   9. Evaluation of parent by measuring performance of offspring
   10. Calculation of percentage of phenotypic variation due to heredity

2. Complete the following heritability (h^2) estimate chart.

	DAIRY		BEEF		SWINE	
	Trait	h^2 - %	Trait	h^2 - %	Trait	h^2 - %
Reproductive	Birth wt.	35-50	Birth wt.	______	________	10-20
			% Calf crop.	______		
Productive	Milk yield	______	________	50-55	Post weaning ADG	25-35
Qualitative	________	50-70	________	50-60	________	55-65
			yield grade	50-60		
Anatomical	________	20-30			________	65-80

TEST

3. List three environmental factors affecting rate of improvement from selection

a.

b.

c.

4. List 3 out of 5 traits with 4 out of 7 common selection aides.

1.	a.
2.	b.
3.	c.
	d.

5. Tell how an animal breeder may lose his money by purchasing animals only by looking at a pedigree,by listing three shortcomings of pedigrees.

a.

b.

c.

6. List in declining order of heritability (h^2) percentage the six traits a rancher looks for in his cow-calf herd.

a.

b.

c.

d.

e.

f.

TEST

7. a. Match the following progeny testing tool with its formula, example, or definition.

a. Selection differential

b. Sire index

c. EATA

d. Adjusted 205 weaning wt.

e. Adjusted 120 day standard

f. Most Probable Producing Ability

1. (PD) Predicted difference

2. Lamb

3. MPPA

4. $\frac{P^* - P}{P}$

5. Estimated Average Transmitting Ability

6. $\frac{\text{Actual weaning wt - Birth wt(70lbs)}}{\text{Age in days when weaning weight obtained}} \times 205 + \text{birth weight}$

b. Identify each of the following characteristics of performance testing as an advantage or disadvantage of performance testing.

_____a. Animals tested under standardized conditions

_____b. Congregation of animals from many farms

_____c. Small sampling

_____d. Close daily unbiased supervision

_____e. Test environment different from normal environment

A = Advantage D = Disadvantage

c. List the certification requirements for a certified litter.

aa.

bb.

cc.

dd.

ANIMAL IMPROVEMENT

UNIT II

ANSWERS TO TEST

1. a. 4
   b. 3
   c. 6
   d. 8
   e. 5
   f. 7
   g. 10
   h. 1
   i. 2
   j. 9

2.

	DAIRY		BEEF		SWINE	
	Trait	h^2-%	Trait	h^2-%	Trait	h^2-%
Reproductive	Birth wt.	35-50	Birth wt.	5-15	Litter size at birth	10-20
			% Calf Crop	5-15		
Productive	Milk yield	20-40	Post-weaning Daily gain	50-55	Post-weaning ADG	25-35
	Persistency of LAC	20-40			feed eff.lb feed/ lb. gain	25-35
Qualitative	Milk fat	50-70	Loineye area	50-60	Carcass length	55-65
			Yield grade	50-60	Loineye thickness	45-55
			Quality grade	50-60	Backfat	45-55
Anatomical	Type Score	20-30			No. nipples	65-80

3. a. Management b. Nutrition c. Climate

4. 1. Body type
   2. Growth rate
   3. Products, fleece, milk, egg production.

   a. Backfat probe
   b. Ultrasonic device
   c. % variation
   d. Rate of gain
   e. Feed efficiency
   f. Milk production
   g. Ratio

ANSWERS TO TEST

5. a. Ethics or honesty of the breeder
   b. Undue emphasis on remote relatives
   c. Favoritism toward progeny of favored animals

6.

a.	Carcass grade	50-60
b.	Rate of gain	40-55
c.	Feed efficiency	40-50
d.	Longevity	10-30
e.	Mothering ability	15-25
f.	Reproductive eff.	5-15

7a. a. 4
   b. 1
   c. 5
   d. 6
   e. 2
   f. 3

7b. a. A
   b. D
   c. D
   d. A
   e. D

7c. Each of two pigs from a production registry litter must:

   a. be 220 lbs at 180 days
   b. have less than 1.5" of backfat
   c. be over 29 inches long
   d. have over 4½ sq. in. loin eye area

ANIMAL IMPROVEMENT

UNIT III

MATING SYSTEMS

TERMINAL OBJECTIVE

Upon completion of this unit, the student will be able to list, diagram, explain, and utilize the eight different mating systems for the highest economical use on the ranch. The student will have completed this unit upon scoring at least eighty five percent on the test.

SPECIFIC OBJECTIVES

1. Match mating system terms with their definition or example
2. List five factors of inbreeding and match matings with percentage of inbreeding
3. Draw an arrow diagram of a line breeding program of sire to grandaughter and explain both pedigree and arrow diagram
4. Define outbreeding and give two examples
5. List three measurable results of crossbreeding and match traits with species and heterosis
6. Diagram a single cross crossbreeding method and label end result of offspring
7. Diagram or tell how a backcross crossbreeding method functions and it's main advantage
8. Diagram or tell how a threebreed cross crossbreeding method functions and list it's main advantage
9. Diagram a typical AB crisscross crossbreeding method and list it's main advantage
10. Diagram a typical ABC three breed rotational crossbreeding method and list it's main advantage

ANIMAL IMPROVEMENT

UNIT III

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheet
2. Provide students with Information and Assignment Sheets
3. Assign selected pages and chapters from reference material for out of class reading
4. Make transparencies
5. Discuss Terminal and Specific Objectives with students
6. Discuss Information and Assignment Sheets with students
7. Arrange a field tour of purebred and crossbred livestock operations in your community
8. Give Test

Students:

1. Read Objective Sheet
2. Study Information Sheets and assigned reading
3. Complete Assignment Sheets and turn into instructor for grading
4. Participate in field trip
5. Take test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objective sheet
2. Information sheet
3. Transparency Masters

   TM 1 - SYSTEMS OF BREEDING

   TM 2 - AMOUNT OF INBREEDING FROM VARIOUS MATINGS

INSTRUCTIONAL MATERIALS

TM 3 - A COMPARISON OF TRAITS OF PUREBRED AND CROSSBRED CATTLE

TM 4 - FEEDLOT RESEARCH OF PUREBREDS AND CROSSBREDS

TM 5 - CROSSBREEDING (CRISS-CROSS METHOD)

TM 6 - CROSSBREEDING (THREE-BREED ROTATIONAL CROSS METHOD)

4. Assignment Sheets

   #1 - Inbreeding Pedigrees

   #2 - Crossbreeding Program

   #3 - Inheritance Percentage and a Crossbreeding Program

5. Answers to Assignment Sheets

6. Test

7. Answers to Test

References:

Books:

1. Blakely, James and Bade, D.H. The Science of Animal Husbandry 2nd Edition, 1979. Reston Publishing Co. Inc. Reston, Virginia.
2. Campbell, J.R. and Lasley, J.F. The Science of Animals That Serve Mankind. 2nd Edition. 1975: McGraw-Hill, Inc.
3. Cole, H.H. and Garrett, W.N. Animal Agriculture. 1980: W.H. Freeman and Company.
4. Lasley, John F. Genetics of Livestock Improvement 3rd Edition, 1978: Prentice-Hall, Inc. Englewood Cliffs, N.J. 07632.
5. Warwick, Everett J. and Legates, James E. Breeding and Improvement of Farm Animals 7th Edition 1979: McGraw-Hill Book Company.

Transparencies:

1. Animal Genetics and Breeding. Overhead Transparency Masters, Vocational Agriculture Service,434 Mumford Hall, Urbana, Illinois. 61801
2. Genetics Overhead Transparency Masters, California State Polytechnic College, San Luis Obispo, California.

ANIMAL IMPROVEMENT

UNIT III

INFORMATION SHEET

I. Terms and Definitions

A. Closebreeding - The mating of close relatives such as parents and offsprings or full brothers and sisters

B. Closed herd - A herd where no outside breeding animals are introduced

C. Crossbreeding - Production of offspring by mating parents of two or more different breeds

D. Grading up - Continued use of purebred males on grade females

E. Hybrid - Progeny of parents that are genetically unlike

F. Inbreeding - Production of offspring by parents more closely related than the average of the population

G. Linebreeding - Form of inbreeding which attempts to concentrate the inheritance of one ancestor or line of ancestors, in a herd

H. Outcross - The mating of an individual to another within the same breed which is not closely related to it.

I. Purebred - An animal of a particular breed which is recorded in the registry for that association's breed

II. Inbreeding (See TM 1-2)

A. A system of breeding in which closely related animals are mated.

B. The production of progeny by parents that are more closely related than the average of the herd

C. Major effect is to increase the number of pairs of genes that are homozygous or recessive genes, which are usually negative in effect and because of their pairing they express themselves in the phenotype

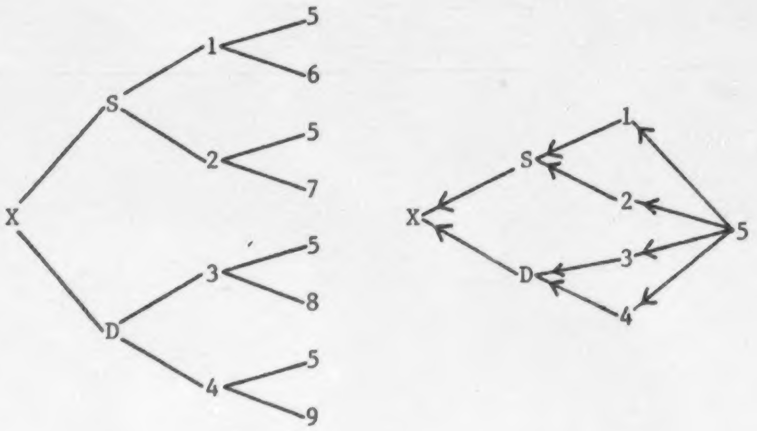
D. Increases breeding purity

E. Main reason for inbreeding is to produce inbred lines that may be used for crossing purposes to achieve hybrid vigor (heterosis)

INFORMATION SHEET

III. Linebreeding (See TM1)

A. A form of inbreeding in which an attempt is made to concentrate the inheritance of one or more outstanding ancestors in the pedigree



IV. Outbreeding: Mating Unrelated Families within the Same Breed (See TM 1)

V. Crossbreeding: Mating Individuals From Different Breeds (See TM 1,3,4)

A. Result in increased heterozygosity

B. Greater variability

C. Increased vigor known as hybrid vigor or heterosis

$$\%\text{ hybrid vigor} = \frac{\text{crossbred average} - \text{purebred average}}{\text{purebred average}} \times 100$$

D.

	Amount of hybrid vigor - heterosis		
Trait	Cattle	Swine	Sheep
Survival-Birth to weaning	Large	Large	Large
Birth rate	Some	Medium	Some
Survival-weaning to market	Some	Some	Some
Weaning weight	Some	Some	Some
Milk production	Some	Some	Some
Conception rate	Some	Some	Some

INFORMATION SHEET

VI. Single Cross Crossbreeding Method (Two breed cross)

  A. Parents are purebreds of two different breeds

  B. Only first cross or F_1 offspring are produced

  C. All offspring are sold

  D. Take advantage of individual heterosis

    1. Vigor

    2. Survival

    3. Growth

    4. Efficiency

  E. Example: Hereford cows and Angus bulls producing white face black calves

VII. Backcross Crossbreeding Method

  A. F_1 males sold for slaughter

  B. F_1 crossbred females mated "back" to one of the parental lines

  C. F_2 offspring are all sold

  D. Takes advantages of maternal heterosis

VIII. Threebreed Crosses Crossbreeding Method

  A. Males of A mated to females of breed B

  B. Males of AB sold

  C. A x B females bred to males of breed C

  D. All A x B x C offspring sold for slaughter

  E. Takes advantage of both individual and maternal heterosis

  F. Breeds can complement each other, i.e. Breeds A and B may be strong on maternal traits while terminal breed C is selected for desired growth, efficiency and carcass traits

INFORMATION SHEET

IX. Crisscrossing Crossbreeding Method (See TM 5)

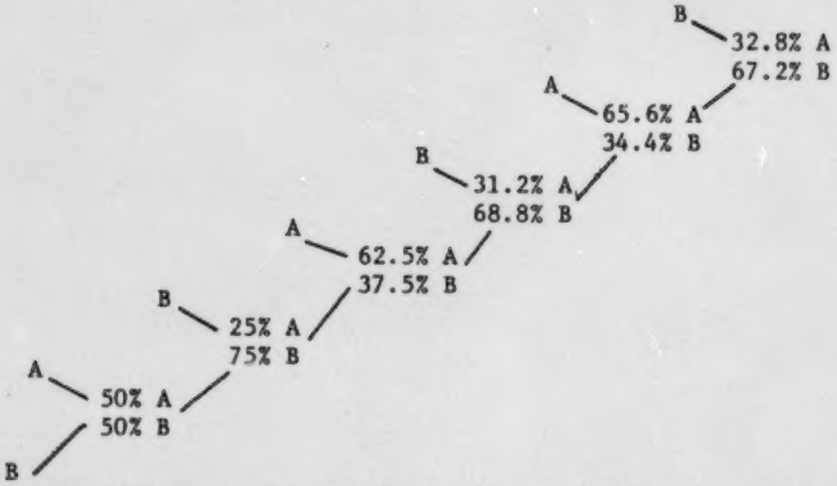
A. P_1 A x B

F_1 ½ A ½ B x A

F_2 $^3/_4$ A ¼ B x B

F_3 $^3/_8$ A $^5/_8$ B x A

B. Offspring move toward having $^2/_3$ of their inheritance from the breed of their immediate sire and $^1/_3$ from the other breed



C. Crossed females express heterosis for material performance

X. Three-Breed Rotational Cross Crossbreeding Method (See TM 6)

A. A system of crossbreeding which systematically uses three or more breeds

B. P_1 A x B

F_1 ½ A ½ B x C

F_2 ¼ A ¼ B ½ C x A

C.

Generation	Breed of Sire	% of each breed in the offspring
1	B	50% A 50% B

INFORMATION SHEET

Generation	Breed of Sire	% of each breed in the offspring
2	C	25% A 25% B 50% C
3	A	62.5% A 12.5% B 25% C
4	B	31.2% A 56.3% B 12.5% C
5	C	15.6% A 28.1% B 56.3% C

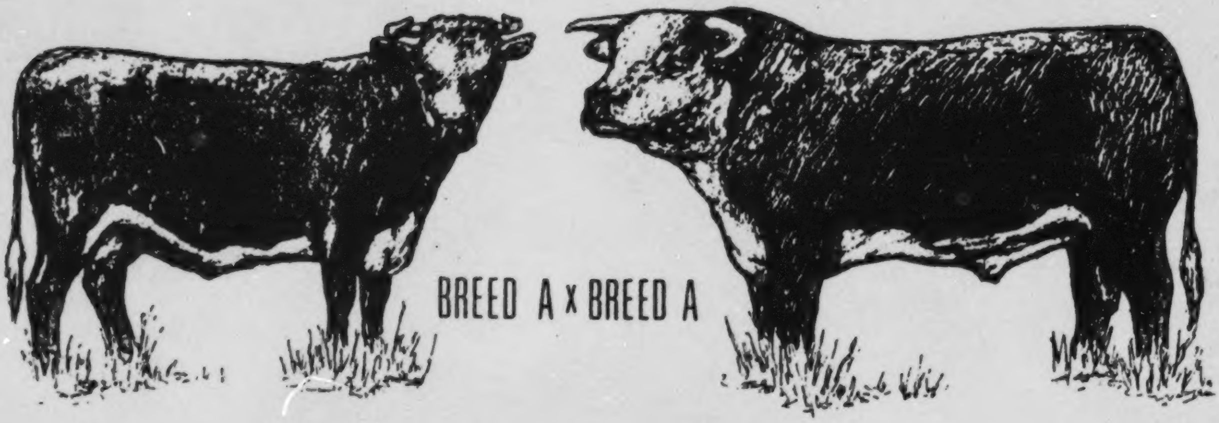
D. Once the rotation of sires is completed, it can begin over again

E. Maximum amount of hybrid vigor in both the dams and offsprings

F. After the fourth generation, one breed can never contribute more than 56 to 57 percent of the inheritance

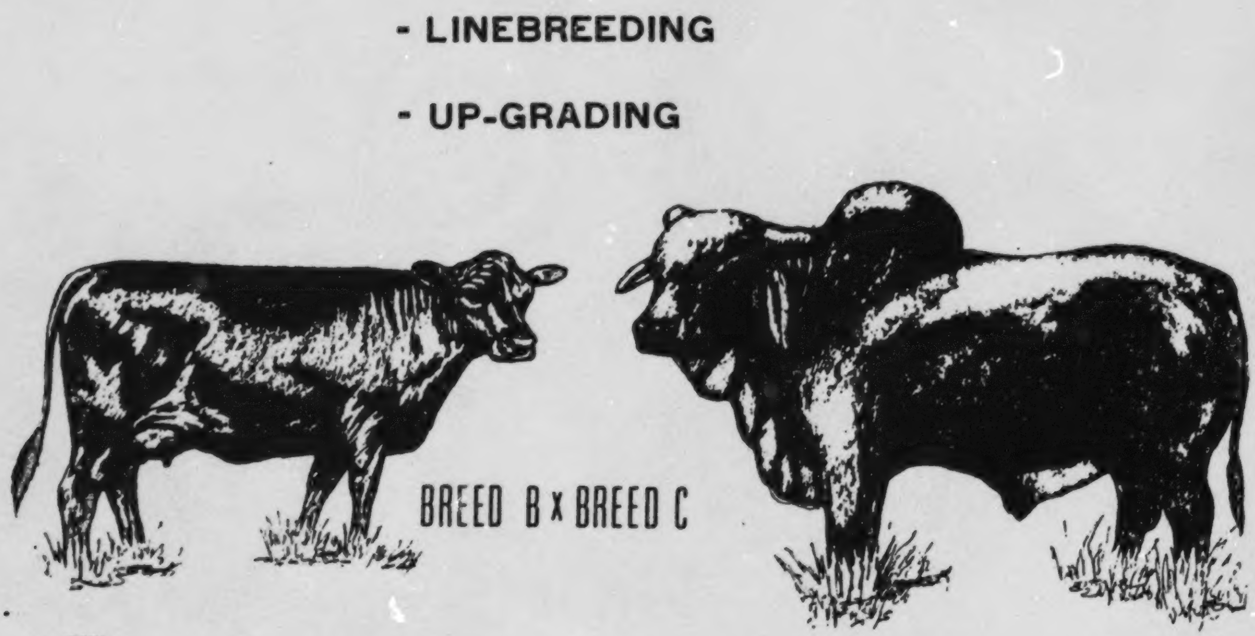
OK

SYSTEMS OF BREEDING


BREED A x BREED A

1 STRAIGHTBREEDING

- INBREEDING
- LINEBREEDING
- UP-GRADING


BREED B x BREED C

2 OUTBREEDING (Crossbreeding)

Vocational Agriculture Service – College of Agriculture – University of Illinois at Urbana-Champaign (Breeding 22)
From Lesson Plans for Voc. Agr. Instructors, Texas A & M University

OK

AMOUNT OF INBREEDING FROM VARIOUS MATINGS

MATING	OFFSPRING
BROTHER×SISTER	25% INBRED
PARENT×OFFSPRING	
½ BROTHER×SISTER	12.5% INBRED
UNCLE×NIECE	
NEPHEW×AUNT	
½ UNCLE×NIECE	6.25% INBRED
NEPHEW×½ AUNT	
COUSIN×COUSIN	3.125% INBRED

Vocational Agriculture Service – College of Agriculture – University of Illinois at Urbana-Champaign (Breeding 23)
From Lesson Plans for Voc. Agr. Instructors, Texas A &M University

A COMPARISON OF TRAITS OF PUREBRED AND CROSSBRED CATTLE

ok

MATING INVOLVED SIRE×DAM	PERCENT LOST		
	CONCEPTION TO BIRTH°	BIRTH TO WEANING°°	TOTAL
B×B	3.0	20.5	23.5
H×H	2.1	2.2	4.3
B×H	0.0	4.0	4.0
H×B	0.0	4.7	4.7
B×(½B×½H)	0.0	0.0	0.0
H×(½B×½H)	0.0	0.0	0.0
A×(½B×½H)	0.9	0.9	1.8
A×(½A×¼B×¼H)	0.0	0.0	0.0

°=Calves lost as percent of cows pregnant

°°=Calves lost as percent of cows that calved

H - HEREFORD A - ANGUS B - BRAHMAN

Vocational Agriculture Service – College of Agriculture – University of Illinois at Urbana-Champaign (Breeding 26)
From Lesson Plans for Voc. Agr. Instructors, Texas A & M University

863

864

FEEDLOT RESEARCH OF PUREBREDS AND CROSSBREDS

ok

FEEDLOT GAIN - 140 DAY TEST

BREEDING OF			AVE. DAILY GAIN, Lb.	ADVANTAGE FOR CROSSBREEDS
SIRE	DAM	CALVES		
H	H	H	2.36	(2.20 BASEPOINT)
B	B	B	2.04	
H	B	F_1	2.43	10%
B	H	F_1	2.44	10%
F_1	F_1	F_2	2.16	3% LOSS

H - HEREFORD

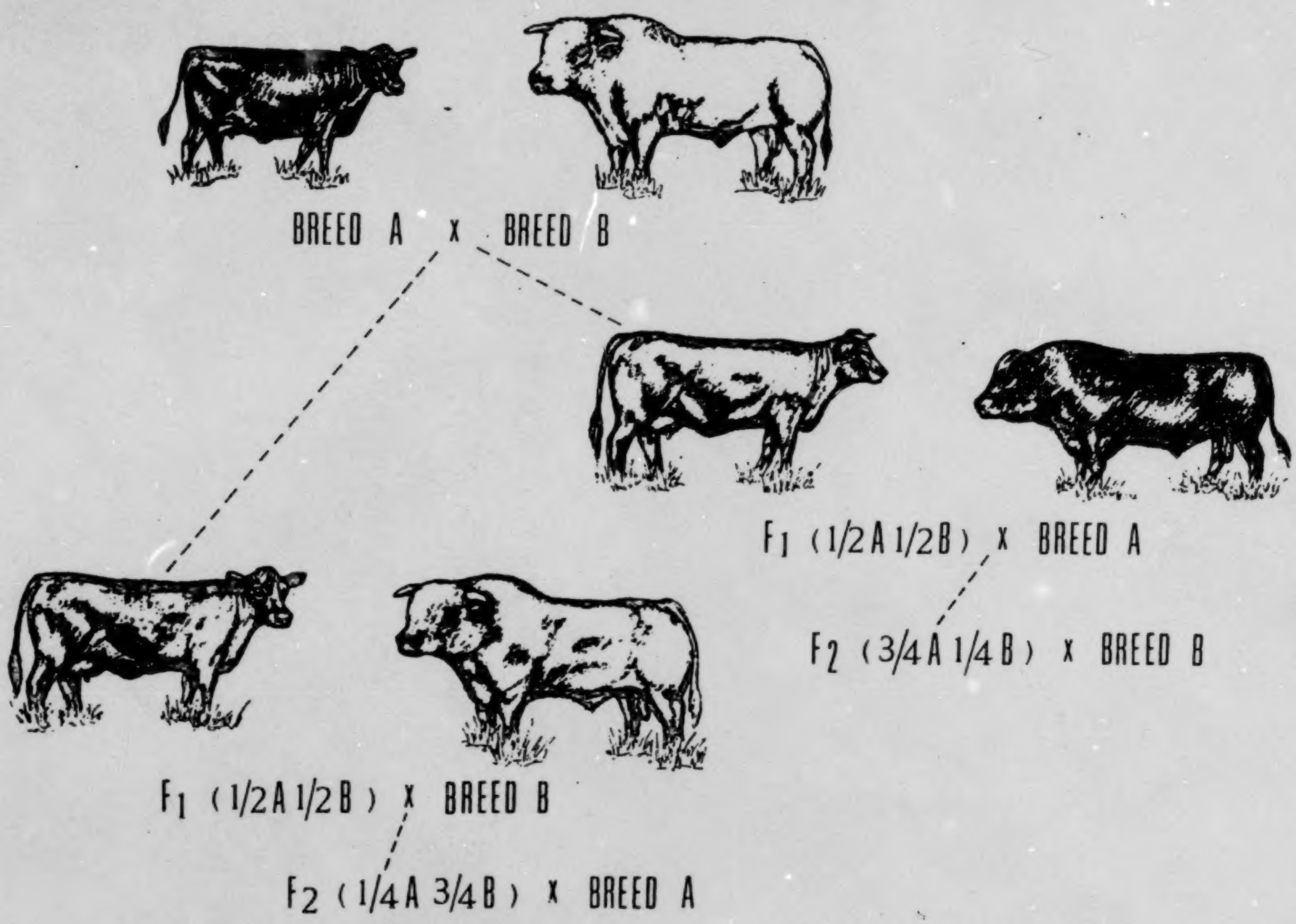
B - BRAHMAN

F_1 - (½H×½B)

Vocational Agriculture Service – College of Agriculture – University of Illinois at Urbana-Champaign (Breeding 27)
From Lesson Plans for Voc. Agr. Instructors, Texas A &M University

CROSSBREEDING (Criss-Cross Method)

OK



BREED A x BREED B

F$_1$ (1/2A 1/2B) x BREED A

F$_2$ (3/4A 1/4B) x BREED B

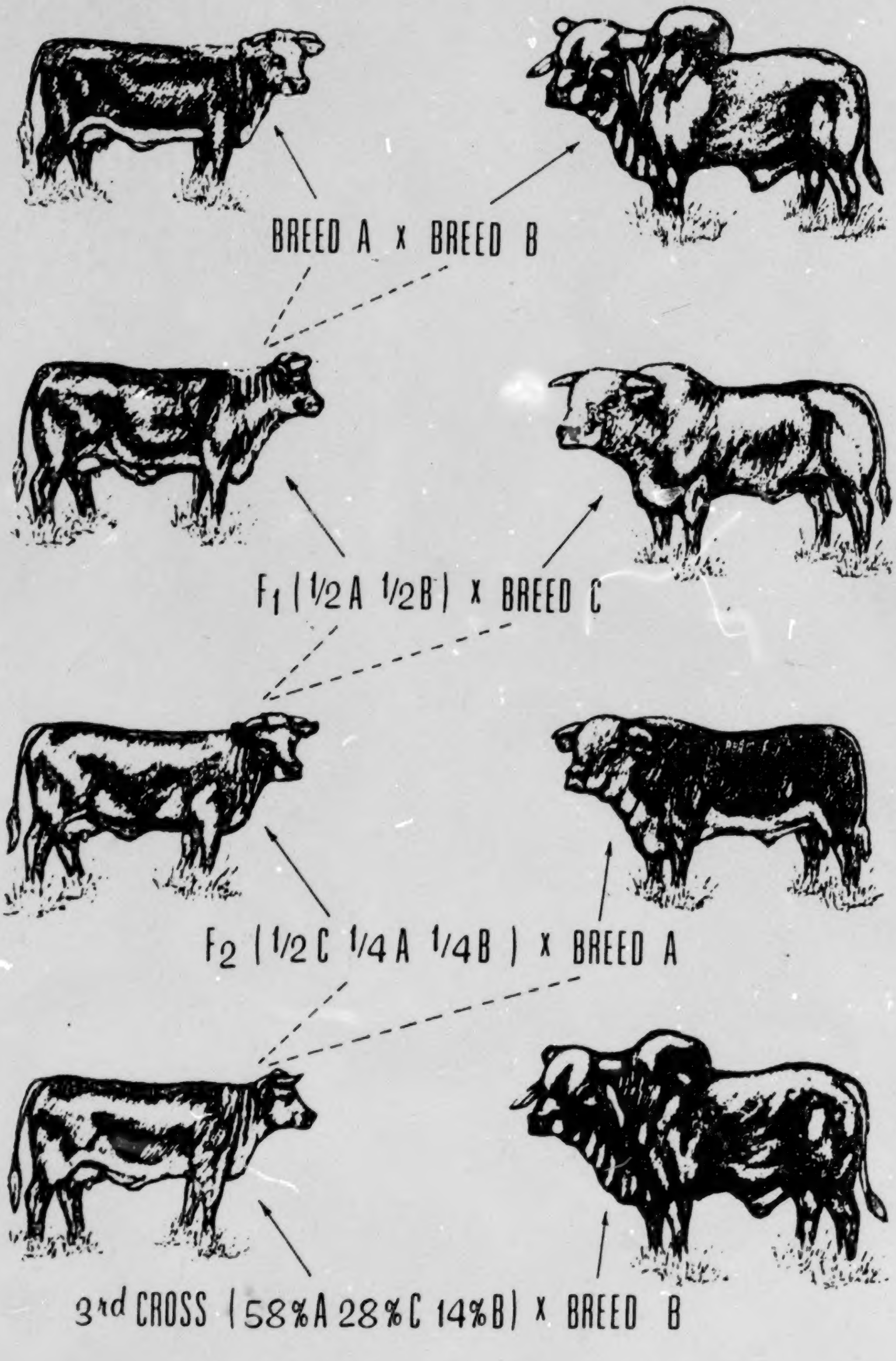
F$_1$ (1/2A 1/2B) x BREED B

F$_2$ (1/4A 3/4B) x BREED A

Vocational Agriculture Service – College of Agriculture – University of Illinois at Urbana-Champaign (Breeding 28)
From Lesson Plans for Voc. Agr. Instructors, Texas A & M University

OK

CROSSBREEDING
(Three-Breed Rotational Cross Method)


BREED A x BREED B
F₁ (1/2 A 1/2 B) x BREED C
F₂ (1/2 C 1/4 A 1/4 B) x BREED A
3rd CROSS (58% A 28% C 14% B) x BREED B

Vocational Agriculture Service – College of Agriculture – University of Illinois at Urbana-Champaign (Breeding 29)
From Lesson Plans for Voc. Agr. Instructors, Texas A & M University

ANIMAL IMPROVEMENT

UNIT III

ASSIGNMENT SHEET #1: Inbreeding Pedigrees

(Please show all your work)

a. Design a pedigree to the fourth generation with no inbreeding.

b. Design a pedigree to the fourth generation with full brother and sister matings.

c. Design a pedigree to the fourth generation with cousin x cousin mating.

d. Draw a four generation pedigree and an arrow pedigree of a linebreeding program which concentrates on the grandsire.

ANIMAL IMPROVEMENT

UNIT III

ASSIGNMENT SHEET #2: Crossbreeding Program

a. Diagram a single cross crossbreeding program using Angus bulls with Hereford cows.

b. Diagram a backcross crossbreeding program with Angus bulls on Hereford cows to the F_2 generation.

c. Diagram a three breed crossbreeding program with Angus, Hereford and Simmental cattle to the F_2 generation.

ANIMAL IMPROVEMENT

UNIT III

ASSIGNMENT SHEET #3: Inheritance Percentage and a Crossbreeding Program

a. Diagram a crisscross crossbreeding method to the F_3 generation using both fractions and decimal percentages.

b. Diagram a three breed rotational crossbreeding program through the F_3 generation with breeds ABC using both fractions and decimal percentages.

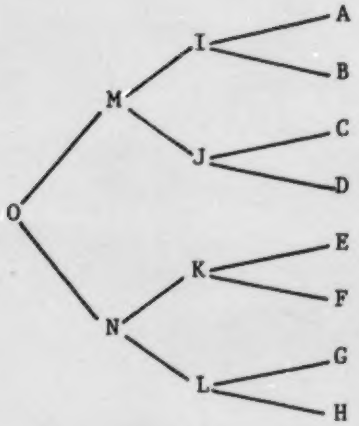
ANIMAL IMPROVEMENT

UNIT III

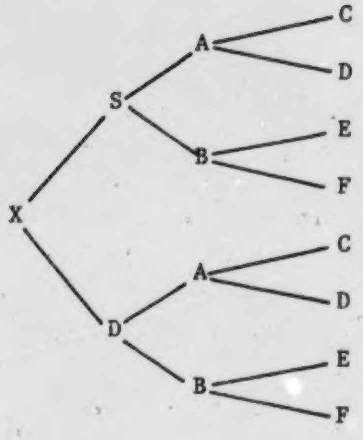
ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #1:

a.



b.



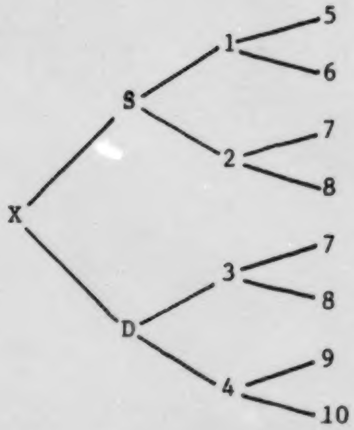
ANIMAL IMPROVEMENT

UNIT III

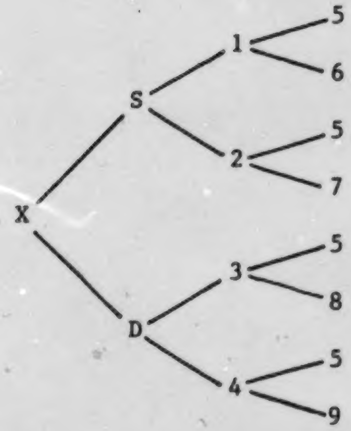
ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #1:

c.



d.



Assignment Sheet #2:

a. P_1 Angus bulls on Hereford cows
F_1 Whitefaced black calves - All are sold

b. P_1 Angus bulls on Hereford cows
F_1 Whitefaced black heifers x Angus bulls
F_2 All are sold

ANIMAL IMPROVEMENT

UNIT III

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #2:

c.	P_1	A Angus Bulls	x	H Hereford Cows	
	F_1	½ A ½ H	Whitefaced heifers	x	S Simmental bulls
	F_2			¼ A ¼ H ½ S	Sold for slaughter

Assignment Sheet #3:

a.	P_1	A x B	or	P	A x B
	F_1	½ A ½ B x A		F_1	50% A 50% B
	F_2	$^3/_4$ A $^1/_4$ B x B		F_2	75% A 25% B
	F_3	$^3/_8$ A $^5/_8$ B		F_3	37.5% A 62.5% B

			A	B	C
b.	P_1	A x B			
	F_1	½ A ½ B x C	50%	50%	0
	F_2	¼ A ¼ B ½C x A	25%	25%	50%
	F_3	$^5/_8$ A $^1/_8$ B $^1/_4$ C x B	62.5%	12.5%	25%

ANIMAL IMPROVEMENT

UNIT III

TEST

1. Match the following terms with their definitions.

   a. Closebreeding
   b. Closed herd
   c. Crossbreeding
   d. Grading-up
   e. Hybrid
   f. Inbreeding
   g. Linebreeding
   h. Outcross
   i. Purebred
   j. Crisscross

   1. Mating of full brothers and sisters
   2. Mating of two breeds
   3. Purebred males on grade females
   4. No outside breeding animals are introduced
   5. Offspring from parents genetically unlike
   6. Mating sire to daughter
   7. Recorded in a registry
   8. Form of inbreeding
   9. Mating within a breed but not related
   10. Form of crossbreeding

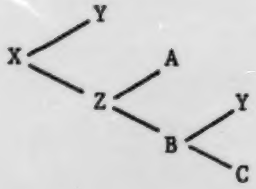
2. Match the following matings to percentage inbreeding (You may answer more than once)

   a. Brother x sister
   b. Parent x offspring
   c. ½ brother x sister
   d. Uncle x niece
   e. Nephew x aunt
   f. ½ uncle x niece
   g. Nephew x ½ aunt
   h. Cousin x cousin

   1. 25% inbred offspring
   2. 12.5% inbred offspring
   3. 6.25% inbred offspring
   4. 3.125% inbred offspring

TEST

3. Draw an arrow diagram of this line breeding program with sire to granddaughter.



4. Define outbreeding.

5. a. List three results of crossbreeding.

1.

2.

3.

b. Complete the following chart:

	Amount of heterosis	
	Cattle	Swine
Survival- birth to weaning	______	______
Birth rate	______	______
Survival - weaning to market	______	______
Weaning weights	______	______
Milk production	______	______
Conception rate	Some	Some

6. Diagram a singlecross crossbreeding program.

TEST

7. Diagram a backcross crossbreeding program.

8. Diagram a three-breed cross crossbreeding method.

9. Diagram a crisscross crossbreeding method using both fractions and decimal percentages to the F_3 generation.

10. Diagram a three-breed rotational crossbreeding program with breeds ABC using both fractions and decimal percentages through the F_3 generation.

ANIMAL IMPROVEMENT

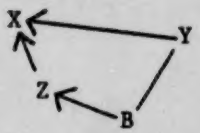
UNIT III

ANSWERS TO TEST

1. a. 1
   b. 4
   c. 2
   d. 3
   e. 5
   f. 1
   g. 3
   h. 4
   i. 2
   j. 5

2. a. 1
   b. 1
   c. 2
   d. 2
   e. 2
   f. 3
   g. 3
   h. 4

3.



4. Outbreeding: Mating unrelated families within the same breed.

5. a.
   1. Increased heterozygosity
   2. Greater variability
   3. Increased vigor or heterosis

   b.

Cattle	Swine
Large	Large
Some	Medium
Some	Some
Some	Some
Some	Some

6. P_1 Angus bulls on Hereford cows

   F_1 Whitefaced black calves - All are sold

ANSWERS TO TEST

7. P_1 Angus bulls on Hereford cows

F_1 Whitefaced black heifers x Angus bulls

F_2 All are sold

A H

8. P_1 Angus Bulls x Hereford Cows

S

F_1 ½ A ½ H Whitefaced heifers x Simmental bulls

F_2 ¼ A ¼ H ½S Sold for slaughter

9. P_1 A x B

F_1 ½ A ½ B x A

F_2 $^3/_4$ A $^1/_4$ B x B

F_3 $^3/_8$ A $^5/_8$ B

or

P_1 A x B

F_1 50% A
50% B

F_2 75% A
25% B

F_3 37.5% A
62.5% B

10.				
P_1	A x B	A	B	C
F_1	½ A x ½ B x C	50%	50%	0
F_2	¼ A ¼ B ½ C x A	25%	25%	50%
F_3	$^5/_8$ A $^1/_8$ B $^1/_4$ C x B	62.5%	12.5%	25%

LIVESTOCK FACILITIES

UNIT I

FARMSTEAD PLANNING

TERMINAL OBJECTIVE

Upon completion of this unit, the student will be able to develop a plan for a new or existing farmstead, considering wind and snow control, functional application, solar factors, remodeling, and economics involved. This objective will be considered achieved by scoring at least eighty-five percent on the test.

SPECIFIC OBJECTIVES

After completion of this unit, the student will be able to:

1. Identify as true or false statements about initial considerations before planning a farmstead
2. List the four essential factors to consider early and at all later stages of planning
3. Identify factors in planning as distance, topography, climate, service, or utility factors.
4. Identify as true or false statements on planning for grain storage and processing
5. Label as true or false statements concerning locating livestock production facilities
6. Select correct answers of multiple choice questions concerning wind and snow control
7. Identify the best solar orientation for facilities
8. List three factors to consider when thinking about remodeling old buildings
9. List three things to do when making a farmstead plan

LIVESTOCK FACILITIES

UNIT I

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheet
2. Provide students with Information and Assignment Sheets
3. Make Transparencies
4. Discuss Terminal and Specific Objectives
5. Discuss Information and Assignment Sheets
6. Assist students in determining best building alternatives considering economics involved.
7. Assist students in developing a new farmstead plan or identifying remodeling alternatives in an existing plan
8. Give Test

Students:

1. Read Objectives
2. Study Information Sheets
3. Complete Assignment Sheets and turn in to instructor
4. Take Test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objectives
2. Information Sheets
3. Transparency Masters

   TM 1 - LOCATION OF FACILITIES IN RELATION TO HOUSE

   TM 2 - SYMBOLS USED IN MAKING A PLAN

INSTRUCTIONAL MATERIALS

4. Assignment Sheets

   #1 - Making a Farmstead Plan

5. Test

6. Answers to Test

References:

1. Midwest Plan Service, Structures and Environment Handbook, Iowa State University, Ames, 1976.

2. Steve Cain, "Three Success Stories on Remodeling", Successful Farming, August 1978, pp. 26-27.

LIVESTOCK FACILITIES

UNIT I

INFORMATION SHEET

I. Initial Considerations Before Planning

  A. Investment

    1. Any new building or remodeling should pay a high rate of return through greater livestock gains, decrease labor, and increase net income

    2. Investing too much is as bad as investing too little with tying up money

  B. What are your goals?

    1. Expand to increase income

    2. Improve labor efficiency

    3. Develop a new enterprise

    4. Greater family enjoyment

    5. Increasing value with minimum investment

    6. Maximizing gross income while minimizing investment

    7. Add supporting enterprise to utilize labor or machinery

II. Essential Factors to Consider Early and at All Later Stages of Planning

  A. Water

    1. If not available, do not consider the location for a new or expanded farmstead

  B. Drainage

    1. All-weather drives must be maintained

    2. Feedlots must be drained and waste runoff must be controlled

    3. Surface flow toward family home must be controlled

    4. Periodic flooding around any building is intolerable

INFORMATION SHEET

C. Production volume

1. Doubling the number of animals in a livestock operation more than just doubles space needed for the livestock itself

2. Feed storage doubles, machinery inventory increases, poor chore routes become more difficult, electrical, water, and drainage services must be upgraded

3. Odor, dust, and noise also increases

D. Off-farm factors

1. Rural housing development

2. Local, state, and federal building and zoning codes

3. Air and water pollution control requirements (E.P.A. regulations)

III. Planning Factors

A. Distance factors help locate one farm activity in relation to others

1. Management requirements of an activity may suggest how close it should be to the living center

    a. Young animals need more supervision and need to be close to the farm office

    b. Grain farms require less space than grain and livestock farms

    c. Livestock on pasture affect the farmstead design far less than confined livestock

2. Size of enterprise

    a. Locate large livestock operations further from the home even though they require more management

3. Pollution by farm

    a. Large confined livestock systems can create waste disposal problems and dust and odor

4. Nuisances

    a. Include noise, dust, chaff, insects, and heavy traffic

    b. Locate so these do not detract from the safety and quality of living for you and your neighbors

INFORMATION SHEET

5. Appearance

    a. A neat, attractive farmstead is an important and worthwhile goal

B. Topographic factors concern "the lay of the land"

1. Site selection

    a. Consider space, drainage, access to water and other utilities, proximity to other farms, view, and neighbors

    b. Consider the largest area you might need, then double it to plan for future expansion

    c. Proximity to access roads - black top, gravel

2. Drainage

    a. Overall surface and sub-surface drainage is one of the most important features of an effective farmstead

3. Slope

    a. Ideal slope is 2% to 6%

    b. South slope is good for natural drying and for livestock feeding areas

4. Sub-surface drainage

    a. Needed for dry basements and elevator pits

    b. Avoid springs, wet weather seeps, and high water tables

C. Climate factors

1. Wind

    a. Can increase both summer comfort and winter discomfort

    b. Locate house upwind

    c. Face open front buildings away from prevailing winter winds

2. Sun

    Useful energy in cold weather

INFORMATION SHEET

   3. Snow and rain
      a. Design for major storms
      b. Obtain assistance from county extension office, SCS, or engineers
      c. Divert clean water away from livestock lots with roof gutters and diversion terraces

D. Service factors
   1. Well planned drives and lanes help the farmstead operate efficiently
   2. Lanes should be firm, well-drained, and wide enough for large machines

E. Utilities
   1. Water
   2. Electricity
   3. Gas
   4. Telephone
      a. Plan for a second phone away from house
   5. Fire protection
      a. Prevention is the best protection
      b. Space buildings at least 50 ft. apart to reduce fire spread
      c. Equip each building and fuel center with fire extinguishers
   6. Safety
      a. During planning be aware of machinery and animal movement, heights of ladders and pits, slick floors, and location of chemicals and fuels
   7. Security
      a. Consider fire and theft alarms and night lighting

INFORMATION SHEET

IV. Grain Storage and Processing

- A. Essential factors
    1. Some water is needed for washing and fire control
    2. Drainage
        a. Need all-weather access
        b. A deep dump pit needs good sub-soil drainage
- B. Distance factors
    1. Locate feed and grain facilities farther from house than fuel and machinery storage and service
- C. Topographic factors
    1. Place on crowned or graded area
    2. A 4-bin facility with center building, drying, and storage for 40,000 bushels requires 100' X 100', plus room for vehicles to approach and leave
- D. Service factors
    1. Large bulk delivery trucks and semitrucks may need access
    2. Drive through rather than back up facilities is needed for semitrucks and 4-wheel trailers
    3. Avoid placement near light-load bridges and culverts
    4 Seperate receiving and load-out drives are desirable for larger facilities

V. Livestock Production Facilities

- A. Water
    1. Optimum production requires adequate water
    2. Cool water is better than warm in hot weather
    3. Also needed for cleaning, waste removal, and summer cooling
    4. Freeze-free water systems
- B. Drainage
    1. Locate facilities on high ground

INFORMATION SHEET

2. More frequent problems here than with any other factor

C. Production volume

1. Space becomes more demanding as utilities, feed, machinery, traffic, and nuisances increase

D. Off-farm

1. Odors, dust and noise from livestock can affect neighbors as well as own family

2. Most nuisances are air or water-borne

3. Locate livestock and facilities downwind

E. Wastes

1. Know restrictions and regulations (E.P.A. Zoning)

F. Distance

1. Varies with kind of animal, its size and age, size of unit, amount of care required

2. Livestock comparisons - equivalents for different kinds of livestock and minimum distances they should be from the house:

1000 lb Beef	200 lb Hogs	1500 lb Dairy Cows	Minimum distance from house for nearest livestock buildings
20	100	13	100 ft
75	375	50	200 ft
500	2500	330	300 ft

(units larger than these should be isolated as far as practical from any residence)

VI. Wind and Snow Control

A. Wind speed

1. Windbreaks - tree shelterbelts or fences - reduce wind velocities

INFORMATION SHEET

2. Wind chill for humans:

Air Temperatures (°F)

Wind mph	-30°	-20°	-10°	0°	10°	20°	30°
10	-58°	-45°	-31°	-22°	-9°	2°	16°
20	-81	-68	-52	-40	-24	-9	3
30	-94	-78	-63	-49	-33	-18	-2
40	-101	-87	-69	-54	-36	-22	-4

3. Wind chill is different for animals because of their hair coats

B. Tree windbreaks

1. Reduce wind velocities 5-10 tree heights upwind and 10-30 tree heights down wind

C. Fence windbreaks

1. Solid fence provides good wind protection for a short distance downwind

2. 80% solid fence reduces wind speed for a greater distance and spreads out snow-drifts for faster melting

3. A 10ft. high slotted fence windbreak (or trees) on a 4 ft. ridge can protect a 200 ft. wide feedlot when the lot slopes 6% - 8% away from the windbreak

D. Positioning windbreaks

1. Locate buildings, feedlot, and equipment within the area of wind protection, but beyond the snow catch zone

VII. Solar Orientation

A. Place long buildings E - W to screen out summer heat

B. Shade south wall with overhang

C. Total sun heat on building walls in winter is greater for buildings oriented E - W

INFORMATION SHEET

D. N - S oriented feed bunks dry faster

E. Shade from silos or buildings can increase snow,

VIII. Remodeling

A. Factors to consider

1. How remodeling will save money

2. How the finished building will make money

3. Is the present building strong enough and physically arranged to justify making changes?

4. If remodeling will not help the value of a farm, consider new building

5. Build new if remodeling doesn't save 1/3 or more of new building

B. Tax deductions

1. Check all items used in the remodeling project for 10% investment credit and annual depreciation

IX. Making a Plan

A. Ariel photos

1. Usually are on a scale of 1" = 660'

2. Contact ASCS or SCS offices for ariel photos

B. Farmstead plan

1. Use squared or engineer's paper with ¼ squares

2. Let each square equal 10' or 20'

3. Locate all existing drives, buildings, water, power, and other facilities within the grid

4. Use symbols where possible to reduce the amount of lettering needed

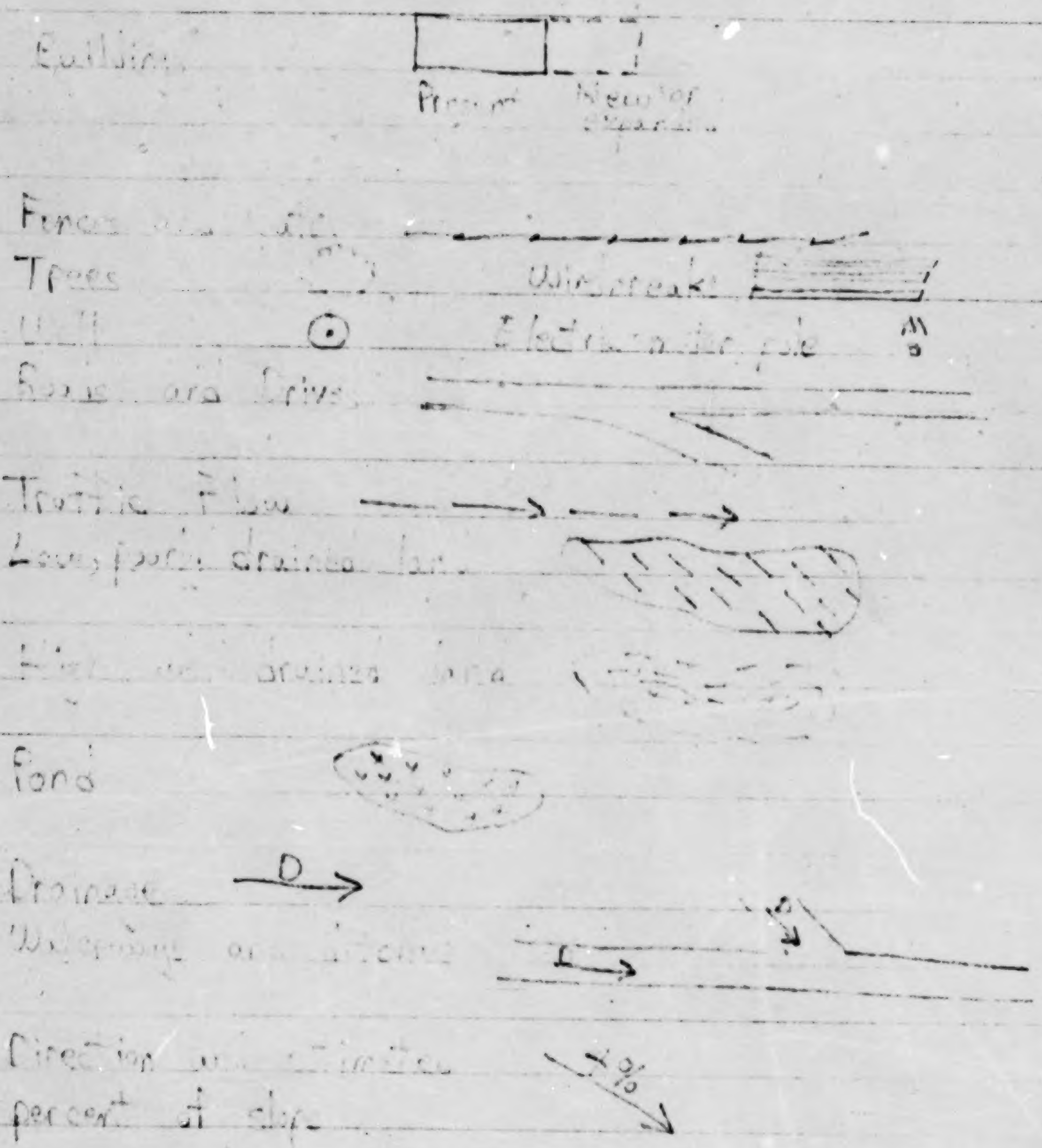
5. Planning on paper prevents mistakes later that can last 20 years

LOCATION OF FACILITIES IN RELATION TO HOU

1000 lb. Beef	200 lb. Hogs	1500 lb. Dairy Cows	Minimum distance from house to nearest livestock building
20	100	13	100 ft.
75	375	50	200 ft.
500	2500	[illegible]	300 ft.

(units larger than these should be located as far as practical from any residence)

SYMBOLS USED IN DRAWING A PLAN



LIVESTOCK FACILITIES

UNIT I

ASSIGNMENT SHEET #1: Making a Farmstead Plan

Obtain graph or engineers paper (¼" squares) and, using ¼" = 20', draw a plan of your present farmstead or an ideal farmstead, including a home, livestock and crop handling facilities, and utility lines. Use symbols presented on transparency #3 whenever possible.

Secure bid from general contractors (at least two) for new building or remodeling. Visit with area financing institutors as to the funds and debt servicing needed.

LIVESTOCK FACILITIES

UNIT I

TEST

1. Identify the following two statements, about initial considerations before planning, as true or false by placing a circle around the appropriate letter.

   T F a. Investing too much in facilities and equipment is as bad as investing too little.

   T F b. Deciding what one's goals are for a farm operation should not be an initial consideration.

2. List all four essential factors to consider early and at all later stages of planning.

   a.

   b.

   c.

   d.

3. Identify each factor as a distance, topography, climate, service, or utility factor by placing a D,T,C,S, or U, on the line preceding each factor.

_____a. Sun

_____b. Water availability

_____c. Drainage

_____d. Nuisances

_____e. Safety

_____f. Appearance

_____g. Drives and lanes

_____h. Snow

_____i. Management needs of operation

_____j. Slope

4. Identify each of the following four statements concerning planning for grain storage and processing as true or false by placing a circle around the appropriate letter.

   T F a. Water is not needed near grain facilities.

   T F b. Grain facilities should be placed on crowned areas

TEST

T F c. Avoid placing grain facilities near light-load bridges.

T F d. Grain facilities should be placed closer to the house than fuel and machinery storage.

5. Label as true or false each of the following statements concerning locating livestock production facilities.

T F a. The size and age of animals raised will help determine where the facilities should be located.

T F b. Whether one is raising 100 head of cattle or 100 head of hogs, both operations would be located the same distance from the farm home.

T F c. A facility raising over 2500 head of hogs should be located as far as practical from any residence.

6. Select the correct answer for each of the following multiple choice questions concerning wind and snow control.

_____a. A 20 mph wind at 0°F will cause a wind chill of approximately: a) 0°F b) -40°F c) -100°F d) -20°F.

_____b. Tree windbreaks reduce wind velocity downwind approximately: a) 10-30 tree heights b) 50-100 tree heights c) 2-5 tree heights d) 1 tree height.

_____c. A type of fence windbreak that would provide wind protection for a very short distance downwind is a: a) 25% solid fence b) 50% solid fence c) 80% solid fence d) solid fence.

7. Identify the best solar orientation for each of the following facilities using E - W for east-west orientation and N-S for north-south orientation.

_____a. Feed bunks

_____b. Best orientation for screening out summer heat.

_____c. Best orientation for greater sun heating during winter.

TEST

8. List three factors to consider when thinking about remodeling old buildings:

    a.

    b.

    c.

9. List three things to do when making a farmstead plan.

    a.

    b.

    c.

LIVESTOCK FACILITIES

UNIT I

ANSWERS TO TEST

1. a. T
   b. F

2. a. Water
   b. Drainage
   c. Production Volume
   d. Off-Farm factors

3. a. C
   b. U
   c. T
   d. D
   e. U
   f. D
   g. S
   h. C
   i. D
   j. T

4. a. F
   b. T
   c. T
   d. F

5. a. T
   b. F
   c. T

6. a. B
   b. A
   c. D

7. a. N-S
   b. E-W
   c. E-W

ANSWERS TO TEST

8. Any three of the following:

   a. How remodeling will save money

   b. How the finished building will make money

   c. Is present building strong enough and physically arranged to justify remodeling?

   d. Will remodeling increase farm value?

   e. Remodeling must save a third or more of new building cost.

9. Any three of the following:

   a. Use squared or engineers paper

   b. Locate all existing drives, buildings, power, etc. on the grid.

   c. Use symbols where possible

   d. Obtain ariel photos

LIVESTOCK FACILITIES

UNIT II

WASTE MANAGEMENT

TERMINAL OBJECTIVE

Upon completion of this unit, the student will be able to explain the different systems of collecting and handling animal wastes and determine rates of application. This knowledge will be evidenced by scoring 85 percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student will be able to:

1. Match terms associated with waste management to the correct definitions
2. Identify components, requirements, and advantages of waste handling systems as part of solid or liquid waste handling systems
3. Identify characteristics of slotted, grated, and sloping floors in a collection system
4. List four facilities used to store livestock wastes
5. List two advantages and two disadvantages of anaerobic manure lagoons
6. Identify the effect factors have on different handling systems
7. Match waste transport methods with the type of waste it transports
8. Identify as true or false statements concerning utilization of animal waste on soil
9. Rank handling systems in relation to the amount of nitrogen they loose between excretion and land application
10. List amounts of N,P, and K available to plants from manure.
11. Determine rates of application of manure to get desired yields of selected crops
12. Calculate total lagoon volume needed for various livestock operations

LIVESTOCK FACILITIES

UNIT II

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheet
2. Provide students with Information and Assignment Sheets
3. Make Transparencies and Handouts
4. Discuss Terminal and Specific Objectives
5. Discuss Information and Assignment Sheets
6. Introduce unit by explaining the terminology provided on the Information Sheets
7. Summarize unit by reinforcing the value of animal wastes and methods of handling
8. Assist students in completing Assignment Sheets
9. Give Test

Students:

1. Read Objective Sheet
2. Study Information Sheets
3. Complete Assignment Sheets
4. Take Test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objective Sheet
2. Information Sheets
3. Transparency Masters

   TM 1 - CAPACITY OF ONE-STAGE ANAEROBIC LAGOON

   TM 2 - FLOW CHART OF SWINE WASTE MANAGEMENT SYSTEMS

INSTRUCTIONAL MATERIALS

TM 3 - TONS OF MANURE PRODUCED PER YEAR PER 1,000 POUNDS WEIGHT

TM 4 - CONTENTS OF ONE TON OF AVERAGE FRESH MANURE

TM 5 - NUTRIENTS RETAINED IN MANURE

4. Assignment Sheets

#1 - Calculate Total Lagoon Volume

#2 - Comparing Methods of Fertilizer Application For Nitrogen Loss

#3 - Determining Waste Application Rate

5. Answers to Assignment Sheets

6. Test

7. Answers to Test

References:

1. Midwest Plan Service, Structures and Environment Handbook, Ames, Iowa: Iowa State University, 1976.

2. "Swine Waste Management Alternatives", Pork Industry Handbook, Manhattan, Kansas: Kansas State University, 1979.

3. "Manure Systems Planning Data", Doane's Farm Management Guide, St. Louis, Mo: Doane Agricultural Services Inc., 8900 Manchester Road. 63144, 1980.

4. "Gutter Flushing for Swine Buildings", Doane's Farm Management Guide, St. Louis, Mo.: Doane Agricultural Services Inc., 8900 Manchester Road. 63144 1980.

LIVESTOCK FACILITIES

UNIT II

INFORMATION SHEET

I. Terms and Definitions

  A. Solid manure - Manure with 20% or more solids

  B. Liquid manure - Manure with 4% or less solids

  C. Slurry - Manure with 5-15% solids

  D. Lot runoff - runoff containing animal manure

  E. Clean runoff - runoff that does not contain manure

  F. Aerobic - Requiring free air or oxygen for life

  G. Anaerobic - Process not requiring oxygen for life

  H. Lagoon - Treatment structure for agricultural waste

  I. Effluent - Outflow of wastes stored in lagoons

  J. Nitrate Poisoning - High level of nitrates that can be toxic to livestock and cause "blue babies" (methemoglobinemia) in infant humans

  K. Manure pack - Intential build-up of manure and bedding

  L. Open lot - Livestock facility that is uncovered with a dirt or concrete floor.

  M. Anaerobic pit - Liquid manure handling system that requires no oxygen for life

  N. Oxidation ditch - Liquid manure handling system involving aeration and agitation.

II. Handling Wastes

  A. Need for handling

    1. To maintain good animal health

    2. Avoid air and water pollution

    3. Comply with local, state, and federal regulations

INFORMATION SHEET

B. Characteristics of manure

  1. Manure with up to 15% solids has liquid handling characteristics

  2. Manure up to 4% solids can be handled with irrigation or flushing equipment

  3. Manure with 20-25% solids is stiff, indicating that some drying or liquid removal has taken place

C. Solid manure handling

  1. Manure with 20% or more solids

  2. Requirements

    a. Solid floors that can be bedded or drained

    b. A minimum of equipment

    c. Area on which to spread the solids

  3. Suggestions

    a. Install sloping floors

    b. Locate waterers where manure accumulation is desired

    c. Keep pens full

    d. Haul directly to fields except when fields are frozen

    e. Locate stockpiles away from natural drainage and water sources

    f. Control runoff from lots and stockpiles

D. Liquid manure handling

  1. Advantages

    a. Requires minimal time and labor as it can be stored or treated until spread

    b. Disposal can be postponed to fit schedules, soil conditions, and expected rainfall

INFORMATION SHEET

        c. Odors, unsightliness, and fly problems can be controlled in covered storage

    2. Needed facilities and equipment

        a. Scrapers, gutters, slotted floors, or drains

        b. Storage or treatment unit to which water can be added

        c. Pumps and agitators to stir and remove the waste

        d. Tank truck or wagon

        e. Irrigation equipment

        f. Land to dispose of the manure

E. Precautions with Stored Liquid Manure

    1. Gases are hazardous

        a. 99% of the gas is methane, ammonia, carbon dioxide, or hydrogen sulfide

        b. Methane and carbon dioxide displace oxygen, causing animals to asphyxiate

        c. Ammonia irritates respiratory tracts and makes them more susceptible to disease

        d. Humans entering a storage tank should wear self-contained breathing equipment such as scuba gear

    2. Ventilation

        a. Inadequate ventilation is the primary hazard from manure gases

        b. Provide maximum building ventilation when agitating or pumping wastes from a pit

III. Collecting Livestock Waste

A. Factors to consider

    1. Type of facility

    2. Labor requirements

    3. Investment

    4. Total waste handling system

INFORMATION SHEET

B. Slotted floors

1. Concrete most common and durable, but are heaviest
2. Wood wears and warps
3. Steel, aluminum, and plastic
    a. Easy to install, handle, and replace
    b. More expensive
    c. Aluminum are noisy and corrode when in contact with other metals
    d. Plastic does not conduct heat from animals but are slick

C. Grates

1. Steel straps 1"-1½" wide and 3/16 - ¼" thick are used for farrowing and nursery pigs. Spaced 3/8" - 3/4"
2. Grates of smooth round rods cover the gutter behind dairy cows in stalls

D. Sloping floors

1. Animal traffic will work manure down slopes of about ½" per ft. or more
2. Scrapers are needed to reduce labor
3. Front-end loaders used in large open lots

E. Gutter flushing

1. Two types for hog buildings
    a. Open-gutter for finishing buildings and open paved lots.
    b. Under-slat for farrowing, nursery, and confined gestation
2. Advantages
    a. Construction costs lower than deep pit by 15% for open-gutter with lagoon
    b. Under-slat costs = cost of deep pit
    c. Less odors and gases

INFORMATION SHEET

- d. Less frequent disposal (1-2 times per year)

3. Disadvantages
   - a. Lagoon looses more nutrients than deep pit
   - b. Lagoon needs 4-6 times more area than building
   - c. Open-gutters not feasible for farrowing house or nursery
4. Design
   - a. Open-gutter - 40" wide and 3½" deep with 1.5% slope

F. Collecting runoff

1. Lot runoff contains animal manure, thus is handled as livestock waste
2. Clean runoff from roofs and drives that does not contain manure should be diverted away from the waste management system

IV. Storing Livestock Wastes

A. Facilities

1. Design of livestock housing largely determines type and size of waste storage
2. Types of storage
   - a. Outdoor tank
   - b. Silo
   - c. Pond
   - d. Pit under building - "Danger" - Toxic Fumes can be produced

B. Location

1. Avoid locating below water tables
2. Locate at least 100 ft. from water supply
3. Store solid wastes at least 50 ft. from milkhouse or parlor
4. Locate for all-weather access

INFORMATION SHEET

C. Filling liquid manure storages

   1. Add water before filling with manure

      a. 3"-4" to pits under slats

   2. Keep openings in covered tanks closed when not in use to control flies

   3. Keep frozen manure and debris out of tank

D. Capacity

   1. Depends on number and size of animals, length of time between emptying etc.

   2. Three to six month's capacity desirable

   3. Cleaning pens with high-pressure water may double the volume of wastes

   4. 20-60% of storage volume may be needed for dilution water if the manure is to be distributed with an irrigation system

   5. Storage capacity = (number of animals x daily manure production x desired storage time in days) + cleaning water and freeboard above lowest inlet opening

E. Storage gutters

   1. Narrow gutters used for swine

   2. Wide gutters for swine and dairy

   3. Fills in 3-7 days

   4. Pumped or gravity flows to lagoon or tank

F. Below-ground storage tanks

   1. Shallow tanks (3-4 ft. wide and 4-5 ft. deep)

   2. Large tanks

   3. Covered tanks

INFORMATION SHEET

G. Silos
    1. 15-20 ft. high and 60 ft. in diameter

H. Holding ponds
    1. Receives lot runoff
    2. Capacity designed on inches of rainfall on drained area
    3. Sides and bottom are watertight
    4. Banks are no steeper than 2½:1

I. Solid manure storage
    1. Locate for year-round access
    2. Provide for convenient filling
    3. Up to 180 days storage needed in cold climates

V. Anaerobic manure lagoons
    A. Advantages
        1. Saves labor in removing liquid manure from buildings
        2. Can dispose with irrigation equipment
        3. No oxygen required, thus no aeration is needed
        4. Nitrogen reduction is advantage if disposed on small areas
    B. Disadvantages
        1. Odors produced with sudden changes in temperature and loading rates
        2. Below freezing winters cause little bacterial action, thus spring odors result from bacterial build-up
        3. Work poorly in cold areas
        4. Up to 80% of N. is lost
    C. Location
        1. Near waste source, preferably downhill from it

INFORMATION SHEET

2. As far from farm home as practical

3. Locate over impenetrable soil

D. Design

1. Minimum design volume as obtained from Table 1 (see supplemental information sheet)

2. Livestock wastes as calculated from Table 2 (see supplemental information sheet) multiplied by number of days (180 usually) between pumpings

3. Dilution volume is ½ minimum design volume

4. Safety margin is expected rainfall from a 25-yrs, 24-hr. storm

   a. Kansas values are 4" for Western Kansas, 5" for Central Kansas, and 6" for Eastern Kansas

5. Total lagoon volume = minimum design volume + wastes volume + dilution volume + 25-yr, 24-hr storm volume

   a. Set spillway height to provide this volume and build the dam 12in. higher for freeboard

E. Two-stage lagoon

1. Requires more total volume than one-stage lagoon

2. First cell large enough to contain minimum design volume

3. Second cell sized for waste volume, dilution volume, and ½ the minimum design volume

4. All pumping is done from second cell

F. Shape

1. Build single-cell lagoon square or round

2. Build each cell in multi-cell lagoon 5 times as long as wide

   a. Install inlets and outlets

   b. Limit widths to 75 ft. to remove sludge with dragline

3. Make lagoons as deep as practical to limit area, reduce odors, and increase vertical mixing

INFORMATION SHEET

G. Management

1. Fill new or cleaned lagoon one third to one half full with water
2. Load lagoon continuously, at least once a week
    a. Slug loading at extended, intervals causes increased volatile acids, lower pH, and high odor
3. Keep toxic feed addities out
    a. They retard biological activity
    b. Arsenic, copper, antibiotics
4. Lagoon establishes equilibrium in 2 years
5. Store or haul as much manure as possible during winter to reduce lagoon load
6. Irrigate with lagoon effluent in fall after crop removal and early spring
7. Prevent bank erosion with gravel
8. Install a fence around lagoon and seed bank
9. Remove sludge when needed

VI. Summary of Waste Management Systems

A. Comparison of systems

1. L = Low
2. M = Medium
3. H = High

INFORMATION SHEET

	System					
	Solid Floor	Store and haul	Lagoon	Haul to lagoon	Oxidation ditch	Flush
First cost	L	M	M	M	H	M-H
Operational cost	H	M	L	M	H	M
Repair costs	L	L	L	L	M	M
Management Level	L	L	L	L	H	H
Daily chores	H	M	L	L	L	L
Mechanical breakdowns	L	L	L	L	M	M
Dirty Animals	M-H	L	L	L	L	L
Odor	M-H	M-H	L-M	L-M	L	L-M
Disposal Odor	M	M-H	M	L-M	L	M
Water pollution	M-H	L	L	L	L	L
Nutritional loss	L-M	L-M	H	M	M	M

VII. Waste Transport

A. Solid manure

1. Spreader boxes

a. Pull-type hold 70-525 bushel

b. Under 100 bushel are ground driven

c. PTO driven over 100 bushel

INFORMATION SHEET

2. Calculating number of trips to field

    a. $\frac{\text{tons to be spread}}{\text{tons per load}}$

    b. $\frac{\text{cu.ft. of manure to be spread}}{\text{spreader capacity in bushel x 1.25 cu ft./bushel}}$

B. Liquid manure up to 4% solid

1. Liquid pump satisfactory, but slurry pump more trouble free
2. Settle or screen out solids
3. Protect pumps and power units with pressure switches and circuit breakers
4. Increase size of power unit rated for water capacity by 10% for friction losses and increased specific gravity

C. Slurries of 4-15% solids

1. Agitate before pumping
2. Select power unit size same as for liquid
3. Pumping slurry
    - a. Submerged open impeller centrifugal
    - b. Augers
    - c. Diaphragm pumps
    - d. Vacuum tank wagon
    - e. Piston pumps
4. Disposal
    - a. Tank wagons
    - b. Pipe-irrigation
    - c. Sprinklers
    - d. Surface irrigation
    - e. Handmove system
    - f. Towline
    - g. Big gun

INFORMATION SHEET

VIII. Utilizing Animal Wastes

A. Land application effects

1. Helps build and maintain soil fertility

2. Improves tilth

3. Increases water holding capacity

4. Lessens wind and water erosion

5. Improves aeration

6. Promotes growth of beneficial organisms

7. Excess amounts harm crops, soil, surface and groundwater quality

8. Manures with high carbon-nitrogen ratios, such as with a lot of bedding, bounds up available nitrogen

9. Heavy applications can increase salinity of soil

B. Effects on surface and groundwater

1. Disease organisms harmful to man and animal can be transmitted in water-borne livestock wastes

2. Surface runoff contains infectious agents and oxygen-demanding material

3. Nitrate pollution effects

a. Infant cyanosis (blue babies)

b. Chemical diarrhea

c. Caused by excess nitrogen application

IX. Nitrogen Losses in Handling and Storage

A. Much lost to air as ammonia

B. Less loss in deep pits, liquid storage, and roofed feeding areas

C. Average losses between freshly excreted manure and land application

INFORMATION SHEET

System	Nitrogen lost
Solid	
Daily scrape and haul	25%
Manure pack	35%
Open lot	55%
Liquid	
Anaerobic pit	25%
Oxidation ditch	60%
Lagoon	80%

D. Losses during application

1. Nitrogen lost within four days of application

Method of Application	Waste type	Nitrogen lost
Broadcast	Solid	21%
	Liquid	27%
Broadcast with immediate cultivation	Solid	5%
	Liquid	5%
Knifing	Liquid	5%
Sprinkler irrigation	Liquid	30%

2. Apply as near planting date as possible so more nutrients will be available to plants

X. Nutrient Value of Waste

A. Nutrients available per year after losses due to handling and storage.

Handling and disposal method	Swine			Beef			Dairy		
	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
	.... lbs/1000lb.			Livestock...			Livestock....		
Manure pack									
Broadcast	84	107	124	63	77	99	77	50	112
Broadcast & cultivation	102	107	124	77	77	99	91	50	112
Open lot									
Broadcast	58	61	80	44	45	64	51	30	59
Broadcast & cultivation	70	61	80	53	45	64	61	30	59

INFORMATION SHEET

Handling and disposal method	Swine N	Swine P_2O_5	Swine K_2O	Beef N	Beef P_2O_5	Beef K_2O	Diary N	Diary P_2O_5	Diary K_2O
	....lbs/1000 lb			Livestock....			Livestock...		
Manure pit									
Broadcast	95	111	119	69	82	95	87	54	107
Knifing	124	111	119	94	82	95	114	54	107
Irrigation	92	93	99	65	82	95	84	45	89
Lagoon									
Irrigation	24	25	89	18	18	71	23	14	80

1. Convert P_2O_5 to P by multiplying by .44
2. Convert K_2O to K by multiplying by .83

B. Value for crop production

1. 50% of organic nitrogen is available the year of application, with the rest carried over to succeeding years

2. 70-80% of phosphorus and 70-90% of potassium are available the year of application.

C. Refeeding value

1. Experiments being conducted of refeeding to the same or other species

   a. Mixing raw manure with new feed

   b. Complex processing yielding protein, vitamins, minerals, and water

   c. Coarse solids usually removed and refed

2. Legal constraints may have to be relaxed or modified

XI. Application Rates of Wastes

A. Determine crop nutrient needs (N,P,K)

B. Determine fertilizer value of manure (N P,K)

C. Divide fertilizer value by crop needs to determine how much waste to apply

D. Select lowest value in step C to maximise use of animal waste and supplement with fertilizer

INFORMATION SHEET

E. Select highest value in step C to use animal waste as a complete fertilizer

Table 1
Minimum Design Volume

Climate	Swine	Beef	Dairy
	.... cu. ft.	per lb. of	livestock ...
Cold	2.0	2.4	3.4
* Mild	1.0	1.2	1.7
Warm	.5	.6	.9

* Kansas weather is considered mild

Table 2
Daily Manure Production

Animal Size in pounds	Total lb/day	Manure Production cu.ft. / day
Beef Cattle		
500	30	.50
750	45	.75
1000	60	1.0
1250	75	1.2
Cow	63	1.05
Dairy Cattle		
150	12	,19
250	20	.32
500	41	.66
1000	82	1.32
1400	115	1.85
Swine		
Nursery pig 35	2.3	.038
Growing pig 65	4.2	.070
Finish pig 150	9.8	.16
200	13	.22
Gestate sow		
275	8.9	.15
Sow & litter		
375	33	.54
Boar 350	11	.19
Sheep 100	4.0	.062
Horse 1000	45	.75

INFORMATION SHEET

Table 3
Nutrient Utilization By Crops

Crop	Yield	N	P_2O_5	K_2O
		.... lb/acre.......		
Corn	150 bu	185	80	215
	185 bu	240	100	240
Corn silage	32 tons	200	80	245
Soybeans	50 bu	257	48	120
	60 bu	336	65	145
Grain Sorghum	8000 lbs	250	90	200
Wheat	60 bu	125	50	110
	80 bu	186	54	162
Oats	100 bu	150	55	150
Barley	100 bu	150	55	150
Alfalfa	8 tons	450	80	480
Brome grass	5 tons	166	66	254
Tall fescue	3.5 tons	135	65	185

Table 4
Solid Manure Value as Fertilizer

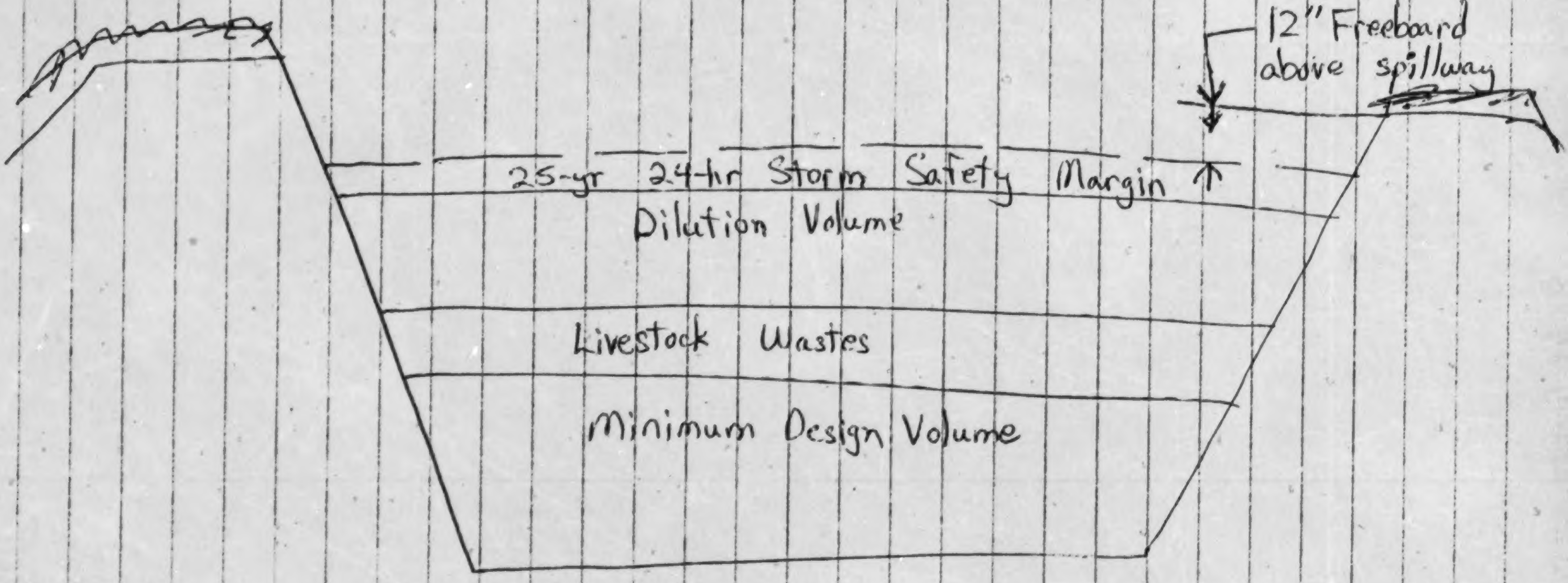
Specie	Bedding	Available N	Total N	P_2O_5	K_2O
		..lb/ton raw waste......			
Swine	No	6	10	9	8
	Yes	5	8	7	7
Beef Cattle	No (open concrete lot)	4	11	7	10
	No (open dirt lot	7	21	14	23
	Yes	8	21	18	26
Dairy Cattle	No	3	9	4	10
	Yes	5	9	4	10
Sheep	No	2	18	11	26
	Yes	2	14	9	25
Horse	Yes	4	14	4	14

INFORMATION SHEET

Table 5
Liquid Manure Value as Fertilizer

Specie	Waste handling	Available N	Total N	P_2O_5	K_2O
		... lbs/1000 gal. raw waste......			
Swine	Liquid pit	20	36	27	19
	Oxidation ditch	12	24	27	19
	Lagoon	3.2	4	2	4
Beef Cattle	Liquid pit	24	40	27	34
	Oxidation ditch	16	28	18	29
	Lagoon	2	4	9	5
Dairy Cattle	Liquid pit	12	24	18	29
	Lagoon	2.4	4	4	5

SS U2-21



CAPACITY OF ONE-STAGE ANAEROBIC LAGOON TM-1

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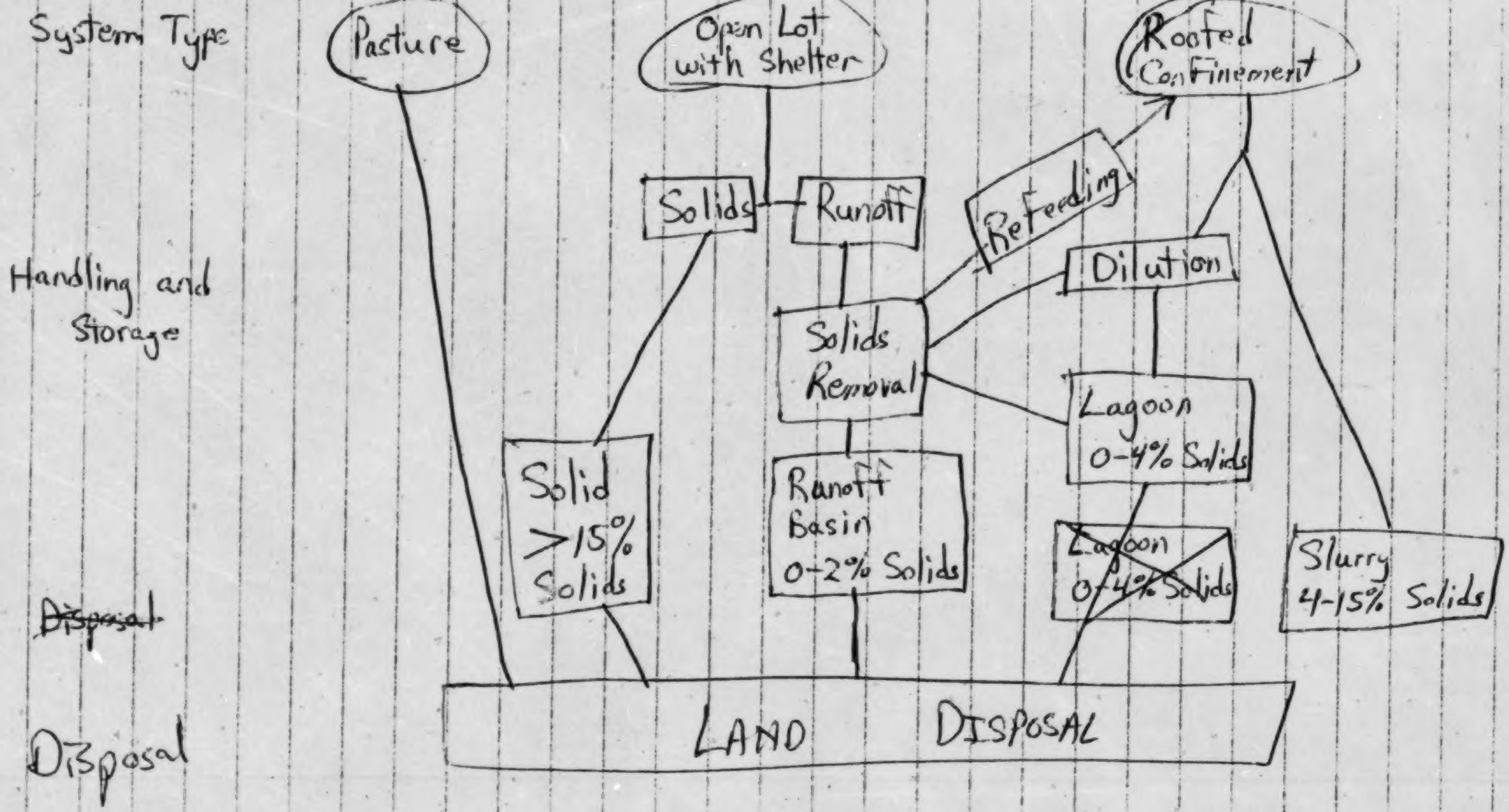


FLOW CHART OF SWINE WASTE MANAGEMENT SYSTEMS

TM-2

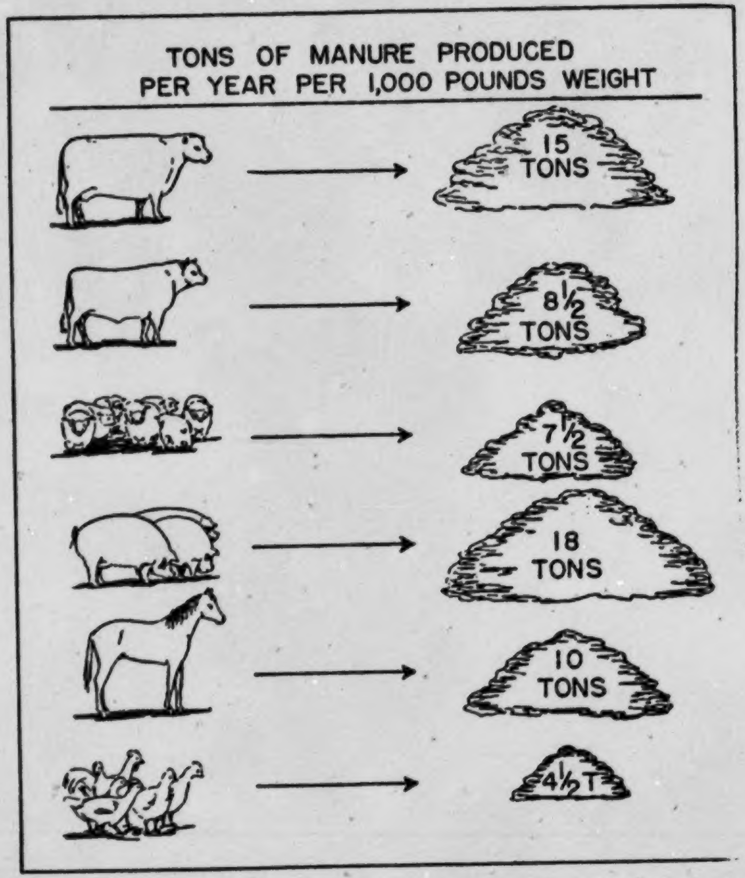
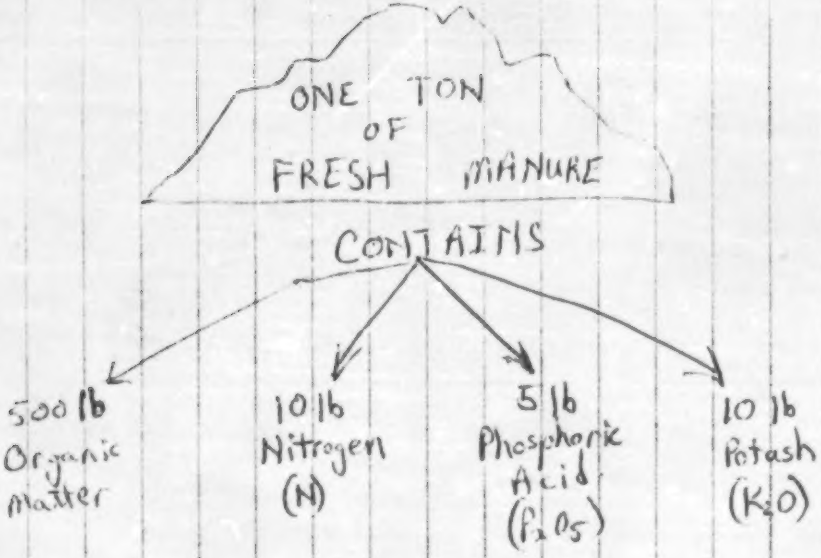


Fig. 8-6. Manure is a big "crop"! How much manure does your farm or ra produce? On the average, each class of stall-confined animals produces per y per 1,000 pounds weight the tonnages shown above. (Drawing by Steve Allur

TONS OF MANURE PRODUCED PER YEAR
PER 1,000 POUNDS WEIGHT

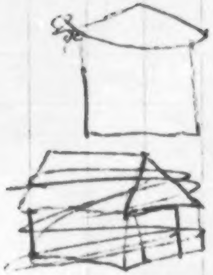
TM-3

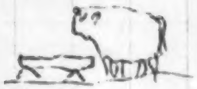


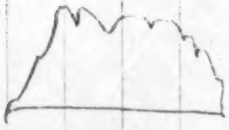
CONTENTS OF ONE TON OF AVERAGE FRESH MANURE

TM-4

SG U2-25







1,000 BU of Corn Contain	Animals Retain	Returned in Manure
1,000 lb N	250 lb N	750 lb N
170 lb P	34 lb P	136 lb P
190 lb K	19 lb K	171 lb K

NUTRIENTS RETAINED IN MANURE TM-5

LIVESTOCK FACILITIES

UNIT II

ASSIGNMENT SHEET #1: Calculate Total Lagoon Volume

Calculate total lagoon volume for a central Kansas beef feedlot raising 1,000 head of 1,000 lb cattle with all wastes draining into the lagoon. Use the following steps:

1. Calculate minimum design volume from Table 1.
2. Calculate livestock wastes from Table 2.
3. Figure dilution volume as ½ the minimum design volume.
4. Add safety margin: assume 2 acres drain into lagoon

LIVESTOCK FACILITIES

UNIT II

ASSIGNMENT SHEET #2: Comparing Methods Of Fertilizer Application For Nitrogen Loss

Assume you raise 150 head of 150lb Finish hogs in an open lot system. Determine pounds of nitrogen available per year if simply broadcasting the manure, and pounds of nitrogen available per year if incorporation into the soil immediately follows broadcasting.

LIVESTOCK FACILITIES

UNIT II

ASSIGNMENT SHEET #3: Determining Waste Application Rate

Determine how much liquid dairy cattle manure stored in a lagoon should be applied to a corn field that you want to yield 150 bu per acre. Use the manure as a complete fertilizer.

1. Determine crop nutrient needs (Table 3)

2. Determine fertilizer value of manure (Table 5)

3. Determine amount to apply

   $\frac{\text{Step 1}}{\text{Step 2}} =$

4. Application rate = lbs/acre

LIVESTOCK FACILITIES

UNIT II

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet # 1

1. Minimum design volume = 1.2 cu. ft./lb. x 1,000,000 lbs livestock = 1,200,000 cu. ft.
2. Livestock wastes = 1.0 cu.ft./day x 180 days x 1,000 animals = 180,000 cu. ft.
3. Dilution volume = 1,200,000 cu.ft. ÷ 2 = 600,000 cu. ft.
4. Safety margin = 5" rain x 2 acres x 27,152 gal/acre for each inch of rain x .133 cu.ft/gal. = 36,112 cu.ft.

Total lagoon volume = 1,200,000 + 180,000 + 600,000 + 36,112
= 2,016,112 cu.ft. needed.

Assignment Sheet #2

1. 150 hogs x 150 lbs/hog x 58 lbs N/1000 lbs lvsk = 1305 lbs N available each year (Broadcast).
2. 150 hogs x 150 lbs/hog x 70 lbs N/1000 lbs lvsk = 1575 lbs N available each year (Broadcast & Incorporation)

Assignment Sheet #3

1. Crop nutrient needs

	lb/acre
N	185
P_2O_5	80
K_2O	215

2. Fertilizer value of manure

	lb/ton solid	lb/gal liquid
Available N	3	.0024
P_2O_5	4	.004
K_2O	10	.005

ANSWERS TO ASSIGNMENT SHEETS

3. Application rate

		Tons/acre Solid	Gal/acre liquid
N:	$^{185}/_{3}$	62	
	$^{185}/_{.0024}$		77,083
P_2O_5:	$^{80}/_{4}$	20	
	$^{80}/_{.004}$		20,000
K_2O:	$^{215}/_{10}$	21.5	
	$^{215}/_{.005}$		43,000

4. Rate = 62 tons/acre solid
77,083 gal/acre liquid

LIVESTOCK FACILITIES

UNIT II

TEST

1. Match the terms on the right to the correct definitions:

_____a. Requiring oxygen for life

_____b. Manure with 4% or less solids

_____c. Runoff containing animal manure

_____d. Not needing oxygen for life

_____e. Manure with 5-15% solids

1. Liquid manure
2. Aerobic
3. Slurry
4. Anaerobic
5. Lot runoff

2. Identify each of the following components, requirements, and advantages as part of solid or liquid manure handling system.

S = Solid, L = Liquid

_____a. Requires minimum equipment

_____b. Requires disposal directly to the field

_____c. Can utilize irrigation equipment

_____d. Odors can be better controlled

_____e. Can produce very hazardous gases

_____f. Requires solid floors

3. Identify as true or false the following characteristics of floors in collection systems.

T F a. Steel and plastic slats are usually the cheapest slat.

T F b. Grates are good for use in farrowing and nursery houses.

T F c. Concrete slats are the most common slats used.

T F d. Animal traffic will work manure down slopes of ¼" or less.

TEST

4. List four facilities used to store livestock wastes.

a.

b.

c.

d.

5. List two advantages and two disadvantages of anaerobic manure lagoons.

Advantages:

a.

b.

Disadvantages:

a.

b.

6. Identify as low, medium, or high the effect each factor has upon the systems mentioned.

	Solid floor	Lagoon	Oxidation ditch
a. First cost			
b. Operational cost			
c. Management level			
d. Odor			
e. Nutritional loss			

7. Match the transport methods on the right to their proper manure type:

_____a. Slurry 1. Spreader

_____b. Solid 2. Auger

_____c. Liquid 3. Pump

TEST

8. Identify as true or false statements concerning utilization of animal waste on soil.

T F a. Can be applied in excess without harming crops or soil.

T F b. Lessons wind and water erosion.

T F c. Manures with high carbon-nitrogen ratios bind up available nitrogen.

T F d. Excess amounts can cause blue babies.

9. Rank in order the following handling systems in relation to the amount of nitrogen lost between excretion and land application. (1 = most N lost)

_____a. Open lot

_____b. Lagoon

_____c. Anaerobic pit

_____d. Oxidation ditch

10. List the amount (percent) of N,P, and K available to plant the year of application.

a. N =

b. P =

c. K =

11. Determine rate of application for solid manure from an open concrete lot beef feedlot to be applied to a wheat field to average 60 bu/acre. Assume no supplemental fertilizer will be used.

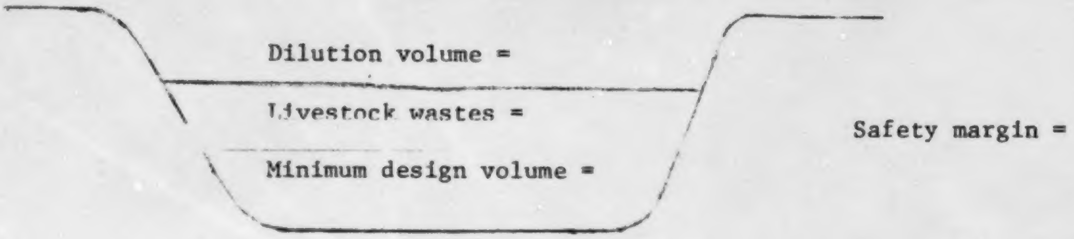
Fertilizer value:	Available N	P_2O_5	K_2O
	4 lb/ton	7 lb/ton	10 lb/ton

Crop needs: 125 lb N/acre
50 lb P_2O_5/acre
110 lb K_2O/acre

TEST

12. Calculate total lagoon volume needed for a 200 head Kansas hog finishing operation with each hog weighing 150 lbs. For safety margin allow for a 5" rain over / acre area.

    - 27,152 gal/acre for each inch rain.
    - 150 hog produces .16 cu.ft. manure per day.
    - 1.0 cu.ft. per pound of livestock needed for minimum design volume.
    - Assume 180 days between pumpings
    - .133 cuft./gal.



Total lagoon volume needed =

LIVESTOCK FACILITIES

UNIT II

ANSWERS TO TEST

1. a. 2
   b. 1
   c. 5
   d. 4
   e. 3

2. a. S
   b. S
   c. L
   d. L
   e. L
   f. S

3. a. F
   b. T
   c. T
   d. F

4. Any four of the following:
   a. Outdoor tank
   b. Silo
   c. Pond (Lagoon)
   d. Pit under building
   e. Gutter
   f. Below-ground tank

5. Any two of the following advantages:
   a. Saves labor
   b. Disperse through irrigation system
   c. No oxygen or aeration needed
   d. Can spread on small area because of nitrogen reduction

   Any two of the following disadvantages:
   a. Odors result with sudden changes in temperature and loading rate
   b. Work poorly in cold areas
   c. Up to 80% of N is lot
   d. Bacterial build-up in spring cause odors

ANSWERS TO TEST

6.

	Solid floor	Lagoon	Oxidation ditch
a.	L	M	H
b.	H	L	H
c.	L	L	H
d.	M-H	L-M	L
e.	L-M	H	M

7. a. 2
   b. 1
   c. 3

8. a. F c. T
   b. T d. T

9. a. 3 c. 4
   b. 1 d. 2

10. a. 50% b. 70-80% c. 70-90%

11. Application rate = 31.25 tons solid manure per acre.

12.

Minimum design volume	=	30,000
Livestock wastes	=	5,760
Dilution volume	=	15,000
Safety margin	=	18,056
Total lagoon volume	=	68,816

LIVESTOCK FACILITIES

UNIT III

ENVIRONMENTAL CONTROL

TERMINAL OBJECTIVE

Upon completion of this unit, students will be able to explain the functions and importance of environmental control in livestock facilities as well as design facilities with features that alter or control livestock building environments. This knowledge will be evidenced through demonstration and by scoring 85 percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, students will be able to:

1. Match terms associated with building environment to the correct definitions.
2. List five factors that influence animal heat loss to the environment
3. Identify as true or false statements concerning insulation
4. Identify as true or false statements related to the ventilation process
5. List two methods of controlling ventilation
6. List four advantages of ventilation
7. List two factors affecting how much to ventilate
8. Rank seasons of the year in relation to amount of ventilation required
9. List two reasons for providing heat in the milking parlor
10. Identify as true or false statements related to horse building ventilation
11. Calculate resistance value for walls or ceilings

LIVESTOCK FACILITIES

UNIT III

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheet
2. Provide students with Information and Assignment Sheets
3. Make Transparencies
4. Discuss Terminal and Specific Objectives
5. Introduce unit by explaining the terminology provided on the Information Sheet
6. Summarize unit by stressing importance of insulation and ventilation
7. Assist students in selecting and determining resistance of building materials
8. Give Test

Students:

1. Read Objective Sheet
2. Study Information Sheets
3. Complete Assignment Sheet
4. Take Test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objective Sheet
2. Information Sheets
3. Transparency Masters

   TM 1 - EFFECT OF INSULATION ON CONDENSATION

   TM 2 - HOW TO DETERMINE RESISTANCE OF A WALL

   TM 3 - RECOMMENDED FAN CAPACITIES

INSTRUCTIONAL MATERIALS

TM 4 - PRESSURE VENTILATION SYSTEM

TM 5 - EXHAUST VENTILATION SYSTEM

TM 6 - "R" VALUES OF VARIOUS MATERIALS

4. Assignment Sheet

   #1 - Calculate Resistance Value of Building Wall

5. Student Handout

   SH-1 "R" Values of Various Materials

6. Answers to Assignment Sheet

7. Test

8. Answers to Test

References:

1. Midwest Plan Service, Structures and Environment Handbook, Ames, Iowa: Iowa State University, 1976.

2. Pork Industry Handbook, Manhattan, Kansas: Kansas State University.

LIVESTOCK FACILITIES

UNIT III

INFORMATION SHEET

I. Terms and Definitions:

  A. Radiation - Exchange of thermal energy between objects by electomagnetic waves

  B. Evaporation - Moisture loss through the skin surface and respiratory tracts

  C. Conduction - Heat transfer between bodies in direct contact through temperature difference

  D. Convection - Heat transfer when moving air or water mix with lower or higher temperature air or water

  E. Relative Humidity - Expressed as a percent, it is the ratio of the actual water vapor pressure to the vapor pressure of saturated air at the same temperature

  F. Resistance (R) Value - Measure of the resistance of heat transfer through material

  G. Condensation - Chemical reaction of reducing a gas or vapor to a liquid

II. Animal Thermal Environment

  A. Heat transfer from animals

    1. Radiation

      a. Heat transfers from warmer object to cooler object

      b. Rate depends on the objects temperature and nature of their surfaces

      c. Sun radiation can be reduced 30-50% with shade.

    2. Evaporation

      a. Domestic animals (cattle, swine, sheep) have minimal moisture loss through the skin

      b. Mostly done through respiratory tract

INFORMATION SHEET

        - c. Nonsweating species adjust to high temperature stress by increasing panting
    - 3. Conduction
        - a. Transfer between bodies in direct contact
        - b. Animals adjust conductive heat loss by changing contact area
            - i. Huddling with a warm animal
            - ii. Standing up from a cold floor
    - 4. Convection
        - a. Occurs when particles of a fluid mix with lower or higher temperature particles
        - b. Fans produce forced convection
- B. Factors influencing heat loss
    - 1. Body features
        - a. Body surface area
        - b. Body covering
            - i. Hair
            - ii. Color
        - c. Moisture vaporization
        - d. Water excretions
        - e. Blood flow
    - 2. Environmental features
        - a. Air movement
        - b. Relative humidity
        - c. Surface temperatures
        - d. Surrounding temperature

INFORMATION SHEET

III. Insulation

  A. Functions

    1. Conserves heat during cold weather
    2. Reduces the rate of heat gain in hot weather
    3. Controls condensation on building walls
    4. Foundation insulation reduces frost heaving, keeps floors warmer, and reduces heat loss

  B. Types

    1. Loose-fill
      a. Mineral wool, vermiculite, granulated cork, etc.
      b. Especially adapted for use in ceilings
      c. Vapor barrier needed or room side of wall or ceiling
    2. Batts and blankets
      a. Among easiest and cheapest ways to add insulation
    3. Insulation board
    4. Block insulation
    5. Reflective
      a. Metallic or aluminum foil
    6. Air space
      a. Not less than $^3/_4$"
      b. Not more than 4"
    7. Concrete additives
      a. Expanded shale, wood shavings, ground corncobs
      b. Reduces strength

INFORMATION SHEET

C. Selection

1. Depends on "R" value rating

   a. "R" value = resistance of heat transfer through material

   b. Kansas weather requires buildings to have "R" values of 9 for walls and 12 for ceilings

2. "R" values of various materials

Material	
Plywood ½"	.63
Wood-fir or pine 25/32"	.98
Asbestos - cement board 1/8"	.03
Wood fiber board 1"	2.00
Mineral wool blanket 1"	3.70
Expanded polystyrene 1"	3.50
Urethane, rigid, 1"	6.70
Mineral wool, fill type, 1"	3.33
Vermiculate, expanded 1"	2.08
Concrete block, 8"	1.11
Dead Air Space ($^{3}/_{4}$" or larger)	.90
Outside surface value	.17
Inside surface value	.68

D. Determining resistance of a wall

1. "R" value of wall components determined using any "R" value chart

2. Total resistance is sum of component "R" values

E. Vapor barriers for insulation

1. Needed where humidity is high

2. Water in form of water vapor, moves from warmer to cooler areas

3. Condensed water in walls greatly reduces the insulation value

4. Common vapor barriers

   a. Aluminium foil

INFORMATION SHEET

        b. 4 mil plastic film

        c. Asphalt paper

IV. Ventilation Process

A. Air exchange

1. Brings in oxygen and carries out harmful gases and undesirable odors

2. Dilutes air-borne disease organisms

B. Moisture exchange

1. Winter ventilation needed to remove excess water vapor

2. For each 20°F rise in temperature, water holding capacity of air doubles

C. Heat exchange

1. Cooler outside air moved through a building absorbs heat

2. Less air is moved through a building in winter to prevent over-cooling

D. Climate considerations

1. Winter ventilation

    a. Demands moisture and odor removal

    b. Over-ventilation removes too much heat

2. Summer ventilation

    a. Demands heat removal

    b. Usually several times the winter air movement rate

    c. Affected by insulation

    d. Natural ventilation should be used

    e. High air velocities cause no animal discomforts

INFORMATION SHEET

E. Mechanical ventilation

1. Pressure system by blowing air into a building
2. Exhaust system pulls air out
3. Components
    a. Fan
    b. Air distribution system
    c. Controls to regulate fans

F. Air inlets and outlets

1. Uniformity of air distribution depends on location, design, and adjustment of air inlets
    a. Adjustment important during winter
    b. If inlet is open too wide, cold air enters at a low velocity, falls to the floor, and causes draft
2. Need 1 sq.ft. inlet opening for each 600 cfm of fan capacity
3. Design inlets slightly oversized to allow for dirt and debris constricting the opening

V. Ventilation Control

A. Controlled by fan speeds

B. Controlled by partial recirculation of outside air through constant speed, continuously running fans, allowing a portion of air in the building to pass through the fans

C. Controlled by baffling air through a constant speed fan, by reducing the effective diameter of the fan and therefore reducing air passage

D. Controlled by switching the fan on and off using a time clock or thermostat

VI. Advantages of Good Ventilation

A. Better air movement

B. Better feed efficiency

C. Better work conditions

INFORMATION SHEET

- D. Longer building life
- E. Fewer odors
- F. Increased capacity
- G. No drafts or sudden temperature changes

VII. Factors Determining How Much to Ventilate

- A. Amount of heat generated by livestock
- B. Amount of heat generated by heating system
- C. Insulation value of building

VIII. Applications to Swine

- A. Fan capacity
  - 1. Minimum in winter
  - 2. Many times winter value in summer
  - 3. Minimum winter
    - a. Operate at least one fan continuously when inside temperature is above 35°F
    - b. Have thermostat set for when the temperature drops below 35°F
  - 4. Maximum winter
    - a. Provide additional fans to meet capacity for outdoor temperatures up to 55°F
  - 5. Summer
    - a. Install large panels in walls that can be opened for natural ventilation
    - b. Provide additional fans
- B. Heating
  - 1. Brooder lamps
    - a. Suspend with chains
    - b. Mount 30" above pen or 18" above creep area

INFORMATION SHEET

2. Underfloor hot air heat
3. Underfloor cable or pipe heat
    a. Good for young pigs up to 5 weeks old

C. Cooling

1. Evaporative
    a. Lowers temperatures 20°F below outdoors in dry areas
    b. Lowers temperatures 8°F below outdoors in humid areas
2. Mechanical
    a. Limited use because of expense
3. Spray cooling
    a. Good for cooling pigs in high temperatures
    b. .09 gallons of water per hour per pig
    c. Spray cover three quarters width of pen with droplets, not mist or fog

IX. Dairy Ventilation

A. Cows

1. 100 cfm/1000 lb winter capacity
2. Double winter rate for summer ventilation in total confinement

B. Calves

1. Separate calf facilities are recommended for large herds
2. 1/10 cfm/lb of calf for winter
3. Summer = air exchange every 3 minutes

C. Milking Center

1. Maintain 50°F during milking
2. Provide heat to provide operator comfort and dry floor

INFORMATION SHEET

X. Horse Ventilation

   A. Usually get along with uninsulated buildings

   B. Source of heat is the animals

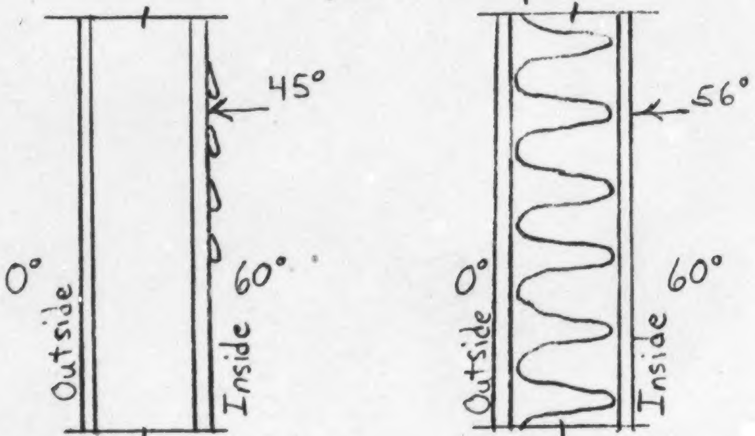
      1. 200-300 BTU per hour per 100 lb of animal weight

   C. Stopping fans to raise temperature increases humidity, condensation, and odors

   D. Additional heat needed if higher ventilation rates are used

SG U3-13

Wall Temperatures



Uninsulated Double Wall

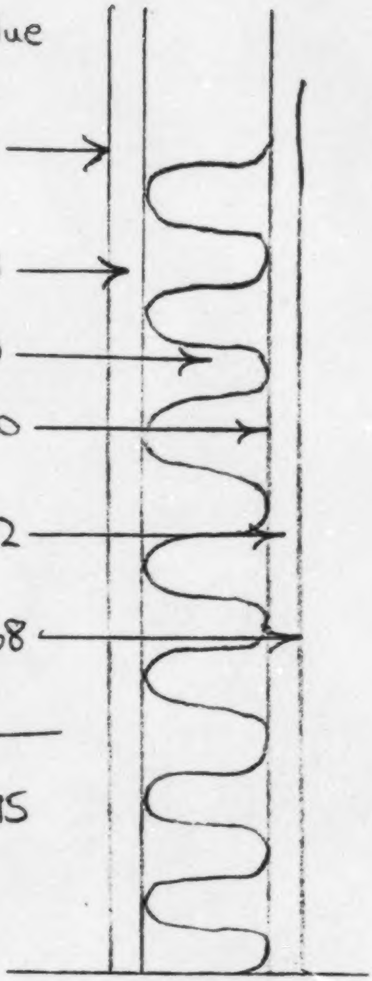
Insulated Wall

If relative humidity is 75%, condensation begins when inside wall temperature is 53°F or less.

Effect of Insulation on Condensation

TM- 1

	R value
Outside Surface	0.17
Wood Siding, 3/4 in.	0.98
3½ in. Blanket Insulation	11.00
Vapor Barrier	0.00
Plywood, ½ in.	0.62
Inside Surface	0.68
Overall R Value	13.45



How To Determine Resistance of a Wall

SG U2-15

T M - 3

Recommended Fan Capacities

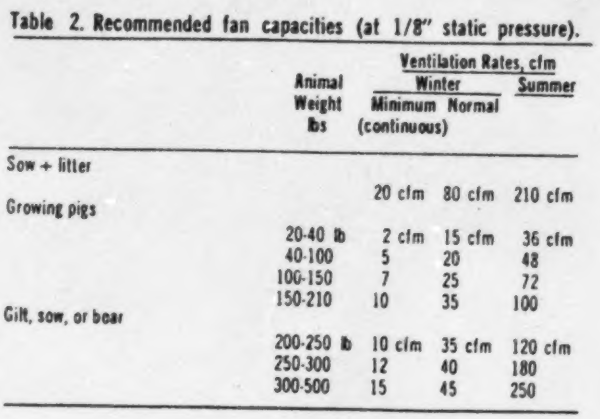
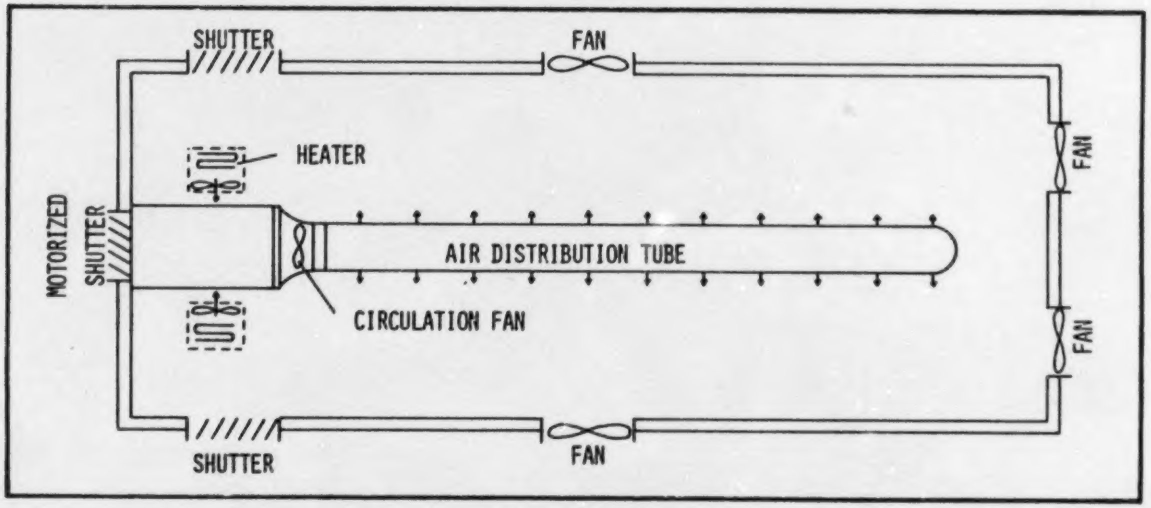


Table 2. Recommended fan capacities (at 1/8" static pressure).

	Animal Weight lbs	Ventilation Rates, cfm Winter Minimum (continuous)	Winter Normal	Summer
Sow + litter		20 cfm	80 cfm	210 cfm
Growing pigs	20-40 lb	2 cfm	15 cfm	36 cfm
	40-100	5	20	48
	100-150	7	25	72
	150-210	10	35	100
Gilt, sow, or boar	200-250 lb	10 cfm	35 cfm	120 cfm
	250-300	12	40	180
	300-500	15	45	250

PRESSURE VENTILATION SYSTEM



Positive Pressure Intake And Air Distribution

Sg U3-17

TM - 5

Exhaust Ventilation Systems

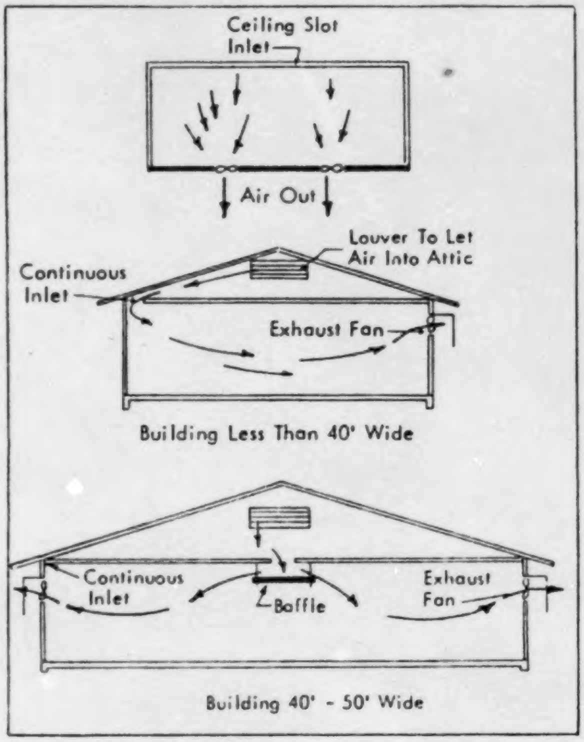


Figure 36. Exhaust fan locations.
Use a center diffusing inlet when the building is 40'-50' wide. Install two inlets for widths over 50'.

TM- 6

DG U3-18

"R" VALUES OF VARIOUS MATERIALS

MATERIAL	"R" value of thickness listed
Plywood ½"	.63
Wood-fir or pine 25/32"	.98
Asbestos-cement board ⅛"	.03
Wood fiber board 1"	2.00
Mineral wool blanket 1"	3.70
Expanded polystyrene 1"	3.50
Urethane, rigid 1"	6.70
Mineral wool, fill type 1"	3.33
Vermiculate, expanded 1"	2.08
Concrete block, 8"	1.11
Dead air space ¾" or larger	.90
Outside surface value is	.17
Inside surface value is	.68

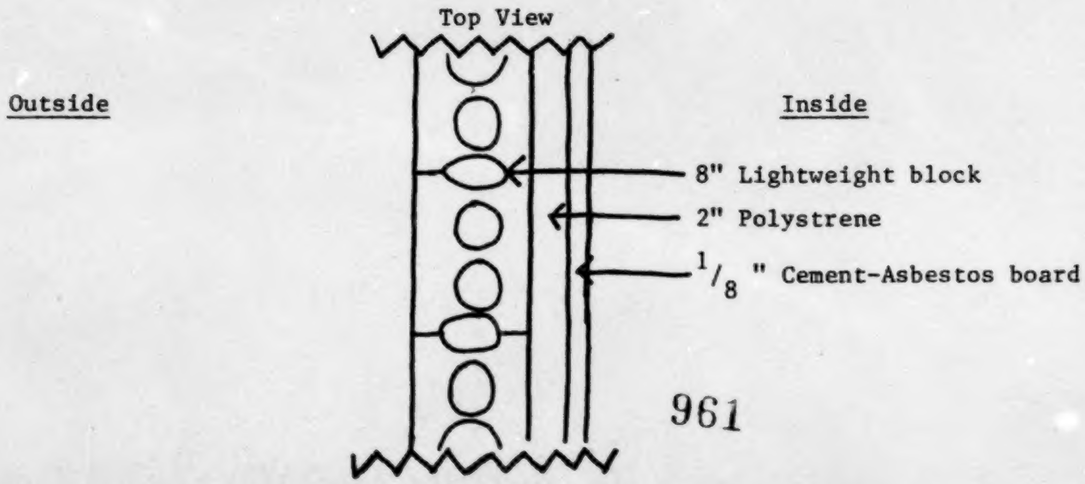
LIVESTOCK FACILITIES

UNIT III

ASSIGNMENT SHEET #1: Calculate Resistance Value of Building Wall

Using the table of "R" values, determine resistance of the building wall at the bottom of the page.

Building Wall



LIVESTOCK FACILITIES

UNIT III

STUDENT HANDOUT 1: "R" VALUES OF VARIOUS MATERIALS

Plywood ½"	.63
Wood-fir or pine 25/32"	.98
Asbestos-cement board $^1/_8$"	.03
Wood fiber board 1"	2.00
Mineral wool blanket 1"	3.70
Expanded polystyrene 1"	3.50
Urethane, rigid 1"	6.70
Mineral Wool, fill type 1"	3.33
Vermiculate, expanded 1"	2.08
Concrete block, 8"	1.11
Dead air space $^3/_4$" or larger	.90
Outside surface value is	.17
Inside surface value is	.68

LIVESTOCK FACILITIES

UNIT III

ANSWERS TO ASSIGNMENT SHEET

Assignment Sheet #1:

A.	Outside Surface	.17
	8" Lightweight Block	1.11
	2" Polystyrene	8.00
	Cement-asbestos Board	.03
	Inside Surface	.68
	Total "R" Value	9.99

LIVESTOCK FACILITIES

UNIT III

TEST

1. Match the terms on the right to the correct definitions.

_____a. Chemical reaction of reducing a gas or vapor to a liquid.

_____b. Measure of the resistance of heat transfer through material.

_____c. Ratio of water vapor pressure to the vapor pressure of saturated air at the same temperature.

_____d. Heat transfer when moving air or water mix with lower or higher temperature air or water.

_____e. Moisture loss through the skin surface and respiratory tracts.

1. "R" value
2. Convection
3. Evaporation
4. Condensation
5. Relative Humidity

2. List five factors that influence animal heat loss to the environment.

a.

b.

c.

d.

e.

3. Identify as true or false the following statements concerning insulation.

T F a. Insulation controls condensation on walls

T F b. Blanket insulation is the easiest but most expensive method of adding insulation

T F c. Air spaces in walls should not exceed 8"

T F d. Kansas weather requires buildings to have "R " values of 9 for walls and 12 for ceilings

TEST

T F e. Vapor barriers are needed where humidity is high

T F f. Condensed water in walls has no effect on insulation value.

4. Identify as true or false the following statements concerning the ventilation process.

T F a. Ventilation brings in oxygen and carries out odors.

T F b. For every 20°F rise in temperature, water holding capacity of air doubles.

T F c. More air should be moved through a livestock building in winter than in summer.

T F d. The two forms of mechanical ventilation are the pressure and exhaust systems.

T F e. Air inlets should be open wider in winter than in summer.

5. List two methods of controlling ventilation.

a.

b.

6. List four advantages of ventilation.

a.

b.

c.

d.

7. List two factors affecting how much to ventilate.

a.

b.

8. Rank the following seasons of the year for ventilation fan use in order from least usage to greatest usage in swine buildings.

_____a. Summer _____c. Spring

_____b. Winter

TEST

9. List two reasons for providing heat in the milking parlor.

   a.

   b.

10. Identify as true or false the following statements concerning horse building ventilation.

    T F a. Major source of heat in horse buildings is usually the horses.

    T F b. Stopping ventilation fans to increase temperature will decrease humidity.

11. A building ceiling has the following components and "R" values. Calculate the overall resistance of the ceiling.

	"R" VALUE
½" Fiberboard	1.25
Vapor Barrier	0.00
3½" Fiberglass Blanket	11.00

LIVESTOCK FACILITIES

UNIT III

ANSWERS TO TEST

1. a. 4 d. 2
   b. 1 e. 3
   c. 5

2. Any five of the following:
   a. Body surface area
   b. Body covering
   c. Blood flow
   d. Moisture vaporization
   e. Water excretions
   f. Air movement
   g. Relative humidity
   h. Surface temperatures
   i. Surrounding temperatures

3. a. T d. T
   b. F e. T
   c. F f. F

4. a. T d. T
   b. T e. F
   c. F

5. Any two of the following:
   a. Fan speed
   b. Time clock or thermostat
   c. Partial recirculation of outside air through a fan.
   d. Baffling air through a constant speed fan.

6. Any four of the following:
   a. Better air movement
   b. Better work conditions

ANSWERS TO TEST

c. Better feed efficiency

d. Longer building life

e. Fewer odors

f. Increased building capacity

g. No drafts or sudden temperature changes

7. Any two of the following:

   a. Amount of heat generated by livestock

   b. Amount of heat generated by heating system

   c. Insulation value of building

8. a. 3

   b. 1

   c. 2

9. a. Operator comfort

   b. Keep floors dry

10. a. T

    b. F

11. Total "R" value is 13.10, including a .68 inside surface "R" value and .17 outside surface "R" value.

LIVESTOCK FACILITIES

UNIT IV

SPECIALITY SYSTEMS

TERMINAL OBJECTIVE

Upon completion of this unit, the student will be able to explain the various livestock facility systems available for beef, swine, dairy, sheep, and horses as well as design systems for each specie. This knowledge will be evidenced through demonstration and by scoring 85 percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, students will be able to:

1. Match terms associated with livestock speciality systems to the correct definitions.
2. List the five common beef facility systems
3. Calculate minimum sq. ft. of lot area needed for a specified number of cattle
4. List four benefits of night lighting in feedlots
5. Explain what type of facilities are needed for cow-calf operations
6. List four cattle handling facilities needed in all beef operations
7. Match swine systems that best fit given situations
8. Give examples of one-stage, two-stage, and three-stage production systems in swine building systems
9. Identify as true or false statements concerning components of confinement farrowing.
10. List four factors to consider when selecting a farrowing house layout
11. Identify as true or false statements about confinement growing houses
12. Identify space requirements in confinement hog finishing systems
13. List the three gestating sow facility options

SPECIFIC OBJECTIVES

14. Describe what building type is best suited for pasture production of swine
15. List two advantages and one disadvantage of tethering sows
16. List three dairy milking herd housing factors
17. Identify as true or false statements concerning dairy stall barns
18. Identify what size dairy herd free stall barns are practical for
19. Explain what must be done with building or remodeling plans for a milking center before construction begins
20. Name the two types of dairy calf housing
21. Describe adequate heifer and dry cow housing
22. Name the two basic types of sheep housing
23. Name the best sheep barn and lot layout for Kansas
24. Describe the building need for horses kept outside
25. List three functions of horse barns
26. Name the two types of horse stalls and their sizes
27. List two other facilities in a horse barn besides stalls
28. Draw handling facilities for cattle
29. List basic components of buildings in swine systems

LIVESTOCK FACILITIES

UNIT IV

SUGGESTED ACTIVITIES

Instructor:

1. Provide students with Objective Sheet
2. Provide students with Information and Assignment Sheets
3. Make transparencies
4. Discuss Terminal and Specific Objectives
5. Discuss Information and Assignment Sheets
6. Introduce unit by explaining terminology on Information Sheets
7. Summarize unit by stressing the importance of building the best, most practical system for the livestock involved
8. Assist students in completing Assignment Sheets
9. Give Test

Students:

1. Read Objective Sheet
2. Study Information Sheet
3. Complete Assignment Sheets
4. Take Test

INSTRUCTIONAL MATERIALS

Included in this unit:

1. Objective Sheet
2. Information Sheets
3. Transparency Masters

   TM 1 - CATTLE HANDLING FACILITIES

   TM 2 - CORRALS FOR BEEF SYSTEMS

INSTRUCTIONAL MATERIALS

- TM 3 - BUILDING SYSTEMS FOR HOG PRODUCTION
- TM 4 - BUILDINGS WITH FARROWING STALLS
- TM 5 - PEN ARRANGEMENT FOR GROWING PIGS
- TM 6 - SWINE FINISHING LAYOUTS
- TM 7 - MILKING CENTER LAYOUT
- TM 8 - DAIRY CALF SHELTER
- TM 9 - HORSE BARN LAYOUT

4. Assignment Sheets
    - #1 - Designing Cattle Handling Facilities
    - #2 - Designing Swine Systems
5. Answers to Assignment Sheets
6. Test
7. Answers to Test

References:

1. Midwest Plan Service, Structures and Environment Handbook, Ames, Iowa: Iowa State University, 1976.
2. Midwest Plan Service, Beef Housing and Equipment Handbook, Ames, Iowa: Iowa State University, 1979.
3. Midwest Plan Service. Swine Handbook. Ames, Iowa; Iowa State University, 1979.
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LIVESTOCK FACILITIES

UNIT IV

INFORMATION SHEET

I. Terms and Definitions

   A. Confinement - Restricting animal living area to an enclosed, controlled environment.

   B. Fenceline bunks - Feed bunks located on one side of a lot and actually serving as part of the fence

   C. Mechanical bunks - Feed bunks separating two pens and bring the feed automatically to the cattle

   D. Farrowing stalls - Structures used in swine farrowing that help separate the sow from her new-born pigs

   E. Free stalls - Farrowing pens modified so the sow can leave and enter at will while the baby pigs are restrained by a low gate behind the sow

   F. A Frames - Small, portable swine structure that is built in the shape of an "A" and used in swine production on pasture

   G. Stanchion - Upright support that restrains dairy cows while milking

   H. Tack room - Equipment and facilities room in a horse stable

II. Beef Systems

   A. Barn and feedlot

      1. Common in cornbelt area

      2. Barn

         a. Open-front barn, open lot, and fenceline bunks

         b. Used in high precipitation areas

         c. Used usually on farms where fewer than 1000 cattle are fed

         d. Face open side south or east

         e. Provide doors in the closed walls for summer ventilation

         f. Slope floors toward open side

INFORMATION SHEET

- g. Pave an apron along open side
- h. Unpaved floors inside barn should be at least 12", and paved floors at least 6" above outside grade

B. Feeding barn and lot

1. Open lots, bedded mounds, with feeding done in barn
2. Used primarily in Dakotas and Western Minnesota
3. Advantages of feed bunk in a building
   - a. Protects feed and feeding equipment
   - b. Feed is not blown from the bunk
   - c. Cattle eat better during severe weather
   - d. Cattle can use building for summer shade and winter storms

C. Open feedlot

1. Weather protection limited to windbreak fence in winter, and/or a sunshade in summer
2. Lots unpaved except along feed bunk and around waterers, requiring more land area
3. Very common in Kansas
4. Any special requirements are related to fitting the feedlot to the available land

D. Cold confinement barn

1. Confines cattle to a building with one open side and with doors and panels in the other side
2. Temperature fluctuates with outside temperature
3. Fenceline or mechanical bunks
4. Used in all climates
5. Reduces problems from snow, wind, runoff and labor

INFORMATION SHEET

6. Need 17 sq.ft./head for small animals and a minimum for finishing cattle

7. Slotted floors applicable - if partly slotted, should have at least 40% slotted

8. Deep storage pit most common under slats

9. Pen capacity 40-100 head best

E. Warm confinement barn

1. Confines cattle to enclosed, insulated, fan-ventilated building with cold weather control

2. Usually mechanical bunks

III. Cattle Space Requirements

A. Consider 120 or 240 per pen (multiples of typical truckload of 60 feeder cattle)

B. Lot area

1. 20 sq.ft. pen animal plus allowance for manure and snow storage, dust and mud reduction, and maneuvering equipment

IV. Lighting Benefits

A. Cattle under light eat less feed with no reduction of daily gain

B. Less trouble with predators and cattle theft

C. Greater animal safety with quieting effect of night lighting

D. Less feed spoilage, because birds seldom roost over lighted feedbunks

E. Reduces stress on new cattle, which often are agitated by darkness

F. Cattle eat during cool summer nights

G. Better feed availability for timid cattle

H. Reduced feedbunk space per head because of 24-hr feeding.

INFORMATION SHEET

V. Cow - calf Facilities

   A. Beef cows need only minimum facilities

   B. Spring and fall calves can be born in a pasture

   C. Portable calf shelters can give calves on pasture a dry place to lie down

VI. Cattle Handling Facilities

   A. Needed in every beef operation

      1. Provides direction and control of animal movement

      2. Reduces labor cost

      3. Provides safety of workers and animals

   B. Needs

      1. Holding pens

      2. Sorting and cutting gates

      3. Headgate and working chute

      4. Loading chute

      5. Conditioning lots for incoming cattle

   C. Holding pens

      1. 1 pen/250 cattle up to 1000 cattle

      2. 10 pens/5000 head facility; then 1 additional pen for each 2000 additional head

      3. Construct 20' x 30' pens for 60 head

VII. Swine System Alternatives

   A. Pasture production most practical for producers who:

      1. Want to feed out pigs with minimum building investment

      2. Have pasture available for proper rotation for disease control

      3. Are tenants

INFORMATION SHEET

4. Farrow once or twice a year
5. Farrow up to about 80 sows per year

B. Partial or total confinement recommended when:

1. Top level management is available
2. A multiple-litter farrowing schedule is used
3. Large numbers of hogs will be raised
4. Labor and available space is limited
5. Capital is available

C. Confinement raising done to:

1. Reduce labor needs
2. Increase efficiency with better feed and disease control
3. Provide better year-round working conditions
4. Reduce animal use of high value land

VIII. Building Systems

A. One-stage production

1. Farrow to finish in one building
    a. No longer common
    b. Space not used efficiently
2. Farrow to feeder-pig
    a. 4 litters a year can be raised to 40-60 lbs in a single pen

B. Two-stage production

1. Farrow, nurse and grow to grow and finish to market
2. Four litters a year can be raised this way

C. Three-stage production

1. Common, especially in large herds of 6 or more farrowings per year

INFORMATION SHEET

2. Farrow to grow to finish

D. Others

1. Pasture may substitute one or more stage in each system

2. Stages may be located on different farms

IX. Confinement System Farrowing Components

A. New-born pigs need 90°F environment with 2° drop per day to 70°F

B. Stalls (crates)

1. 5' x 7' normal size

2. 10% less death of baby pigs than pens

3. Can feed and water in stalls or turn out daily

C. Pens

1. 5' x 12' normal size

2. Requires more cleaning

3. Remove guard rails to convert to growing pens

4. Remove partitions to convert to finishing pens

D. Free stalls satisfactory for:

1. Small producers

2. Sows feeding groups of 10 or fewer

3. Farrowing areas with flat floors since sows dung outside

4. Indoor feeding

E. Slats

1. Use if you do not turn sows out

2. Partial slats

3. Total slats

4. Minimizes labor in manure handling

INFORMATION SHEET

X. Selecting a Farrowing House Layout

  A. Will manure be handled as a solid or liquid?

    1. If other wastes are liquid and capital is available, consider slats and liquid handling

  B. Will sows be fed in or away from the stalls or pens?

    1. Trend is to feed in the stalls

  C. Will sows face each other or the outer walls?

    1. Face in for only one feed alley

    2. Arrange for 3 alleys if possible

  D. Will the stall or pen be used for growing?

    1. Build stalls rather than pens if not using for growing

XI. Confinement Growing Housing

  A. For pigs between weaning and 100 lb weight

  B. Reduces labor and improves feed conversion

  C. Space needs

    1. Each pig needs 3-4 sq. ft. in the pen

    2. 25 pigs per pen maximum

    3. 1 drinking space/25 pigs and 1 feeding space/4 pigs

  D. At least partial slats recommended because they will dirty all of a solid-floor pen

XII. Confinement Finishing

  A. 6 sq.ft. per pig

  B. 25 per pen maximum

  C. Trend today to partial slats with open front

XIII. Gestating Sows Facilities

  A. Confinement

INFORMATION SHEET

1. Producers maintain better control
2. Herds free of soil-borne parasites
3. Pasture can be used for crops

B. Open shelter

1. Requires bedding
2. Covering dunging alley recommended

C. Pasture

1. Use marginal land
2. Use little capital
3. Produce on rented land

XIV. Pasture Production Facilities

A. Provide shade and shelter

B. Locate feeders at a well-drained site on pavement

C. Arrange pasture lots along a permanent road

D. Space needs

1. 10 gestating sow/acre
2. 7 sows and litters/acre
3. 50-100 growing-finishing pigs/acre

E. A frames

1. 7' x 7' size
2. Can start farrowing in March with plenty of bedding
3. Can include or not include a floor

XV. Tethering Sows

A. 10% of first group of sows do not adapt and must be culled

B. After 2-3 generations, 99% of the hogs adapt

INFORMATION SHEET

- C. Little investment
- D. Easier to care for with no stall or fences
- E. Sows appear more at ease

XVI. Dairy Milking Herd Housing Factors

- A. Number of cows
- B. Stall arrangement, size and type
- C. Stall platform covering
- D. Pens needed
- E. Insulation and ventilation type
- F. Kind of milking system

XVII. Stall (Stanchion) Barns

- A. Common in the upper Midwest for herds up to 60
- B. Advantage of opportunity for greater individual attention resulting in better herd health and higher production
- C. Problems
  - 1. Must tie and untie cows
  - 2. Dirty platforms
  - 3. Requires bedding
  - 4. Stooping during milking
  - 5. Expansion beyond 60 restricted
- D. Stall types
  - 1. Stanchions have a metal yoke fastened top and bottom that is free to swing from side to side
  - 2. Tie stalls with neck chain usually preferred over stanchion because of greater cow comfort
- E. Arrangement
  - 1. Face out most desirable with only 1 service alley

INFORMATION SHEET

2. Face in provides easier feeding but milking is less convenient

XVIII. Free Stall Barns

A. Common and practical for herds of 100 or more

B. Either warm (well-insulated and mechanically ventilated) or cold (lightly-insulated and naturally ventilated)

C. Most feeding done in the barn or nearby area

D. One stall provided for each cow

E. Commonly built with 2,3, or 4 alleys

F. Arrange to handle in groups of 50

XIX. Milking Center

A. U.S. Public Health Grade A Pasteurized Milk Ordinance requires approval of a plan for each farm before construction or remodeling begins

B. Plan enough space for all equipment needed in utility room

1. Vacuum pumps

2. Cooling compressors

3. Furnace

4. Water heater

5. Switch panel

6. Supply storage

C. Toilet room may not open directly into the milkhouse

D. Water supply

1. Need 115°F water for washing and sanitizing udders

2. Need 165°F water for washing milk handling equipment

E. Milking parlor

INFORMATION SHEET

F. Holding area that is clean and dry is important

G. Hospital areas for separating, treatment, maternity, and loading needed

XX. Calf Housing

A. Mortality may run 20% the first four months in a calf's life due to scours and respiratory problems

B. "Cold" calf housing

1. Enclosed barn, open front barn, or open front "hutch"

C. "Warm" calf housing

1. Popular for dairymen with 20 or more calves less than 2 months old

XXI. Heifer and Dry Cow Housing

A. Loose housing resting area with a manure pack is adequate

B. Build building at least 30' deep with open front

XXII. Sheep Housing

A. Basic types

1. Open-front buildings

2. Completely enclosed buildings

B. Barn styles

1. Shed

2. Gable

3. Offset gable

C. Environment types

1. Cold housing for ewes and feeder lambs

2. Warm housing for cold climate lambing

XXIII. Barn and Lot Layout

A. Open-front barn with lot

INFORMATION SHEET

1. Best where annual rainfall is less than 30" per year
2. Year round dry-surface access to shelter, feed, and water needed

B. Solid floor confinement barn

1. Provides weather protection that is needed

C. Slotted-floor confinement barn

1. Offers clean, dry floors with minimum cleaning labor
2. Needed building size ½ that of solid floor confinement
3. Lambs gain equally well and internal parasites can be controlled
4. Provide better summer comfort
5. Good for intensive production units
6. Sheep are more sure-footed and hooves wear more evenly on expanded metal than on other floor materials

XXIV. Open-front Horse Buildings

A. Needed for horses kept outside

B. Face open side away from prevailing winds

C. Feed hay outside in racks to conserve bedding

XXV. Horse Barn Layouts

A. Classified by function

1. Breeding
2. Riding
3. Loose housing
4. Hay
5. Utility

B. Other horse facilities

1. Alleys are used for handling and resting animals

INFORMATION SHEET

2. Clear span structures 36' - 50' wide are used for exercising and training horses and as sale barns

3. Clear spans 50' - 100' are for exercising, training, and riding arenas. Width of 110' for indoor show ring

4. Open-front housing of 32' width for animal shelters, storage, and utility buildings

XXVI. Horse Stalls

A. Box stalls

1. Commonly 12' x 12' for riding horses

2. Equip with Dutch doors, full length sliding door, or swinging gates

3. Provide hay-grain box mangers

4. Preferred for pleasure horses

5. Partitions 7' high of wood or concrete masonry

B. Tie stalls

1. Require half the area, less bedding, and are easier to clean than box stalls

2. Good for confining animals that are restless in box stalls

3. Typically 5' x 9'

4. Grain and hay manger provided

5. Provide partition height of 6' up front and 4½' at the rear

XXVII. Other Facilities in the Barn

A. Feed room

1. Usually size of a box stall

2. Rodent control essential

3. Store hay in overhead loft

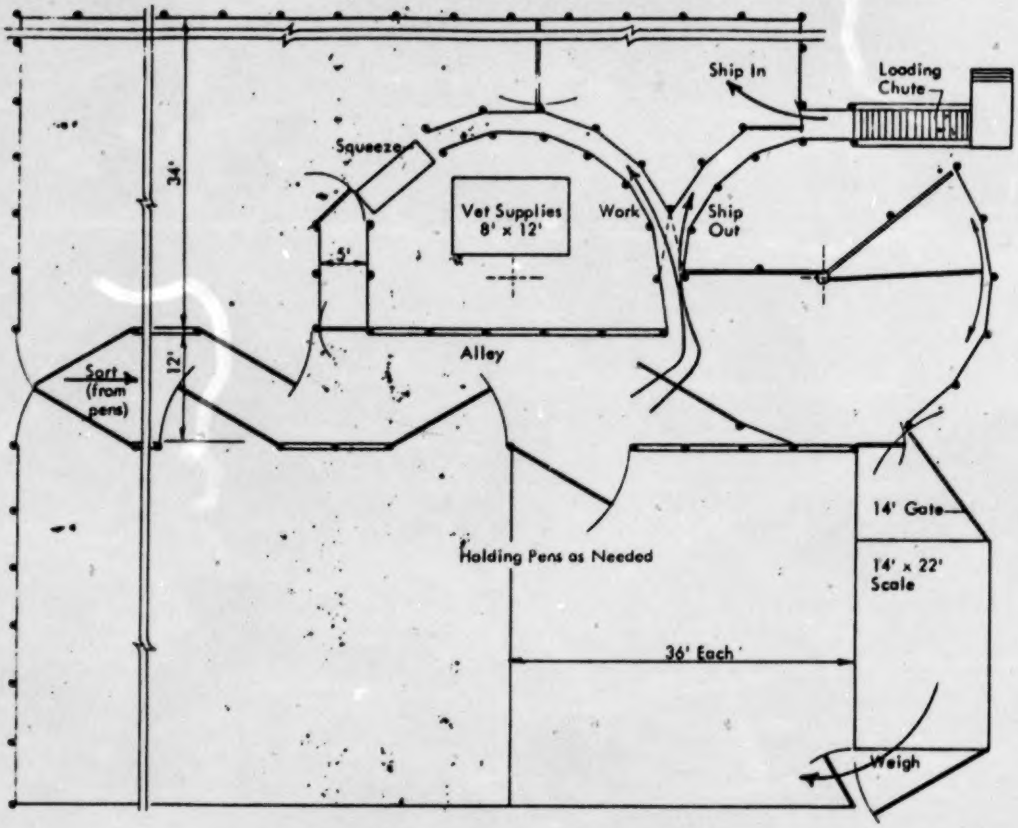
4. Figure $1^3/_4$ lbs hay and 1 lb grain per day per 100 lbs horse

INFORMATION SHEET

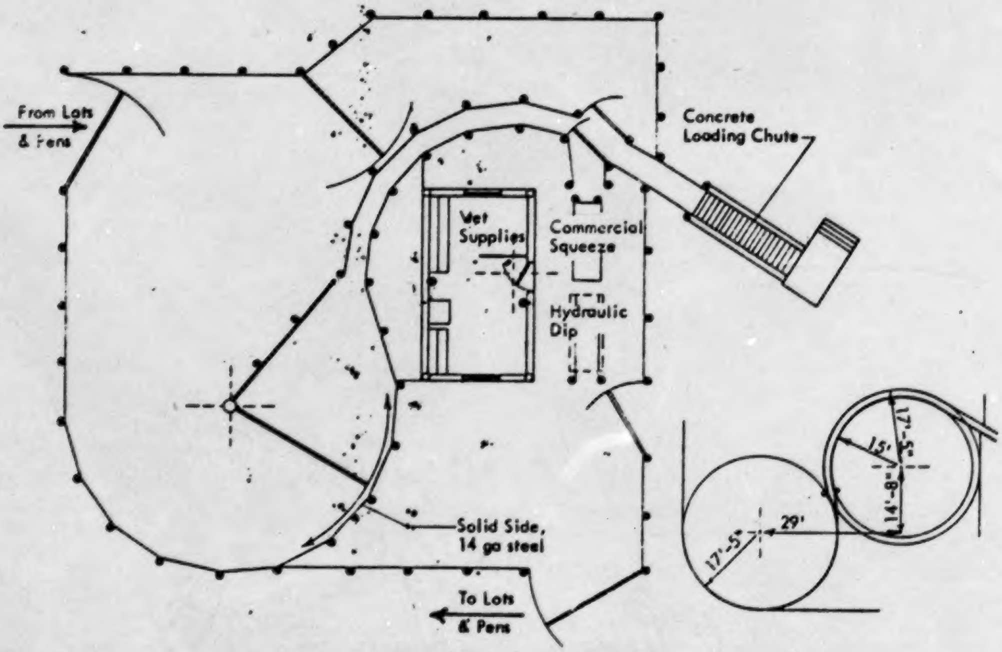
B. Tack room

1. Contains some or all of the following equipment and facilities, depending on stable size and needs
    a. Saddle racks
    b. Tack box
    c. Bridle and halter racks
    d. Shoeing box
    e. First aid kit
    f. Clothes closet
    g. Storage cabinets
    h. Shelves
    i. Filing cabinets, desk, chairs, furniture
    j. Refrigerator, hot and cold running water, cooking facilities
    k. Working and loafing areas
2. Toilet and shower facilities adjacent

CATTLE HANDLING FACILITIES

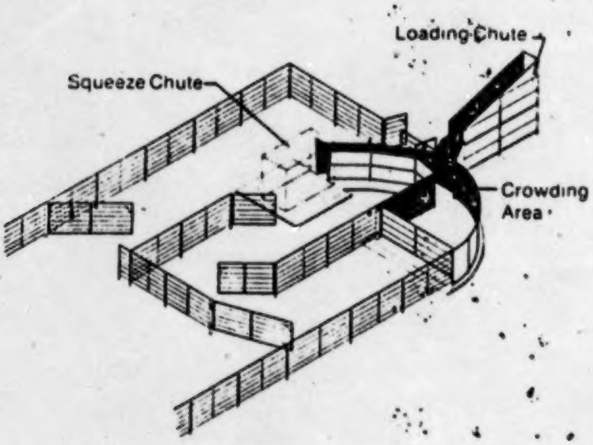


Corral with Double Circle

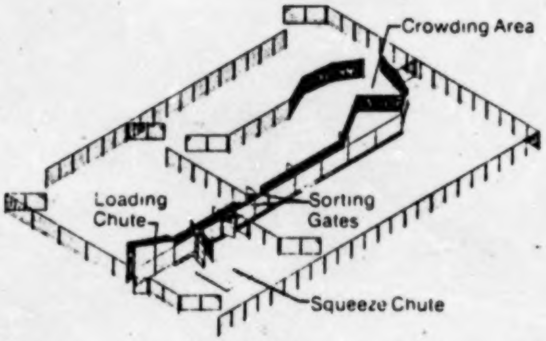


Crowding Pen in One Circle, Work Areas in the Other

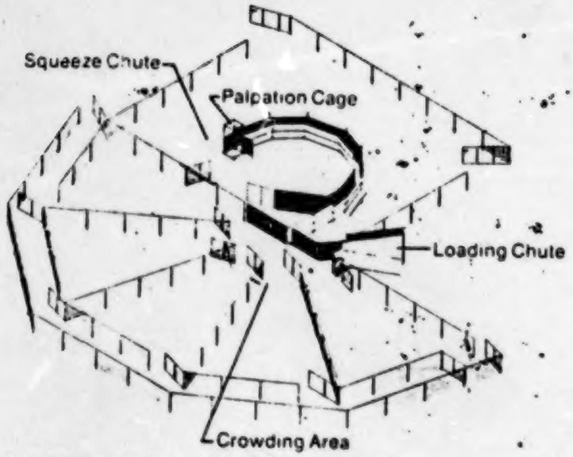
CORRALS FOR BEEF SYSTEMS



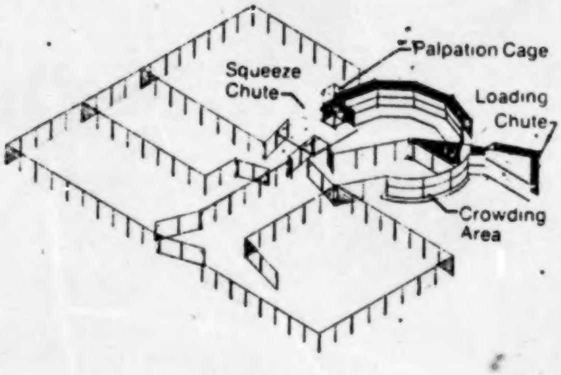
25-75 head.



Up to 200 head.

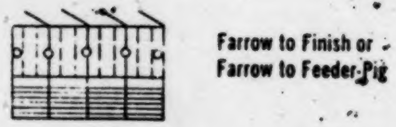


70-400 head or more.

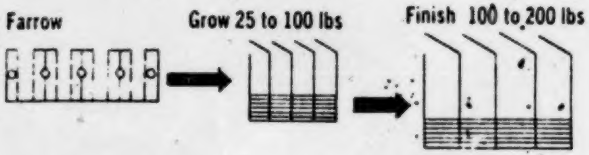


70-400 head or more.

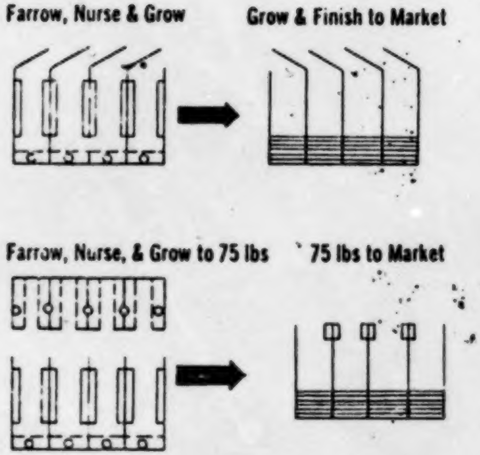
BUILDING SYSTEMS FOR HOG PRODUCTION



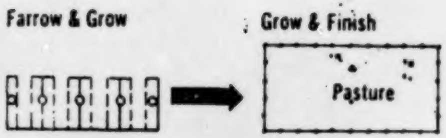
One-stage (1 building)



Three-stage (3 buildings)

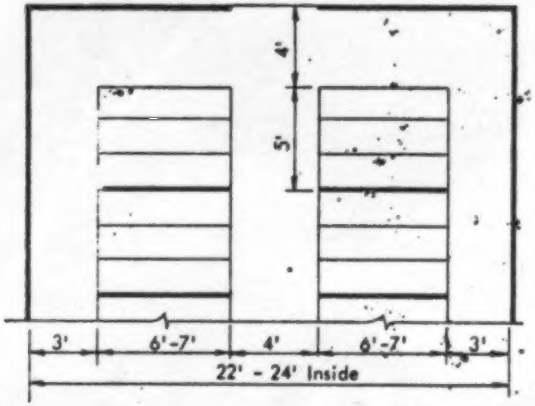


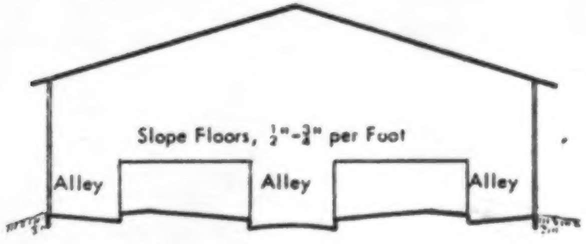
Two-stage (2 buildings)



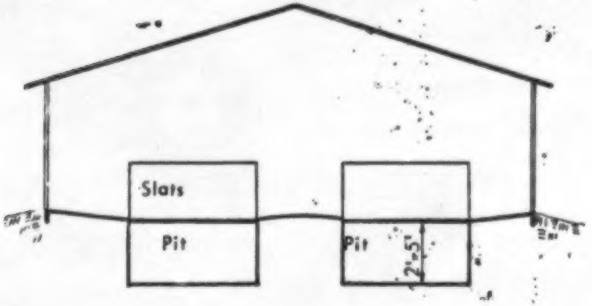
Alternatives

BUILDINGS WITH FARROWING STALLS

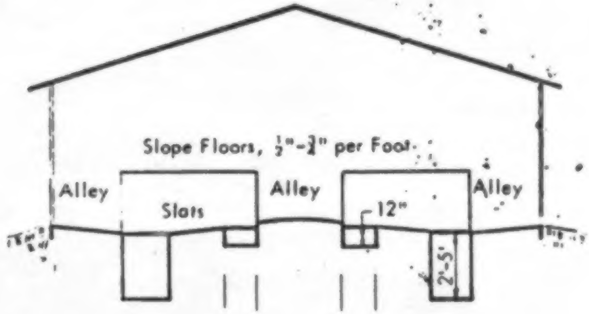




2 Slope Solid Floor



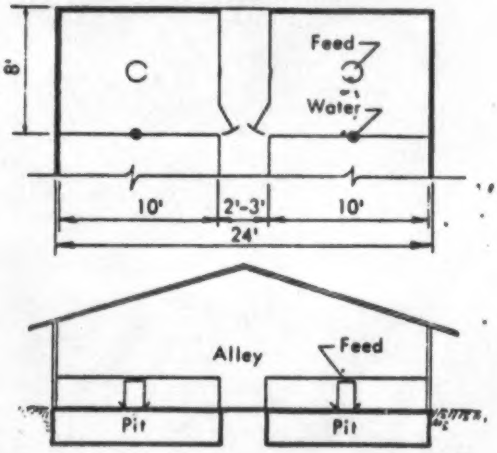
Full Slats Under Farrowing Stalls



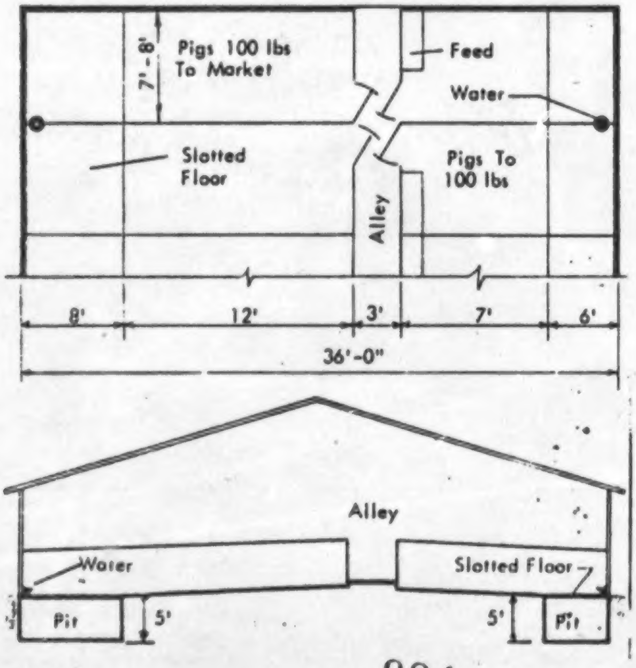
Partial Slats Under Farrowing Stalls

PEN ARRANGEMENT FOR GROWING PIGS

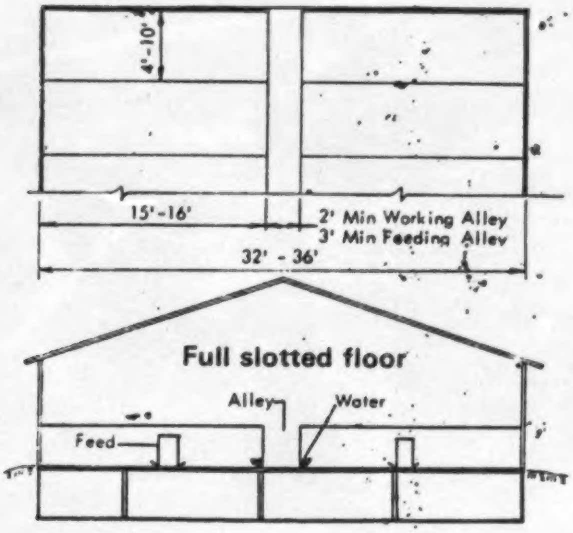
Growing pens

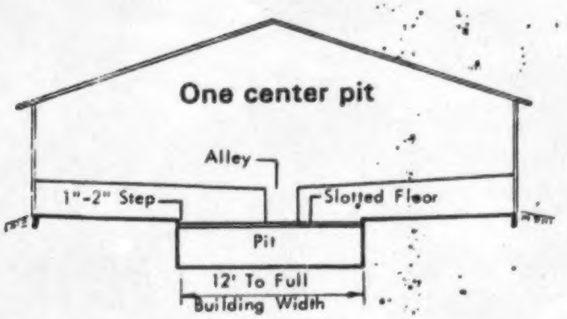


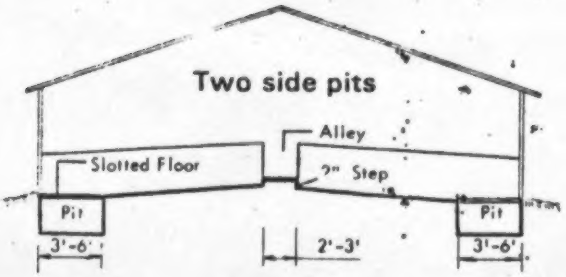
Growing-finishing pens.



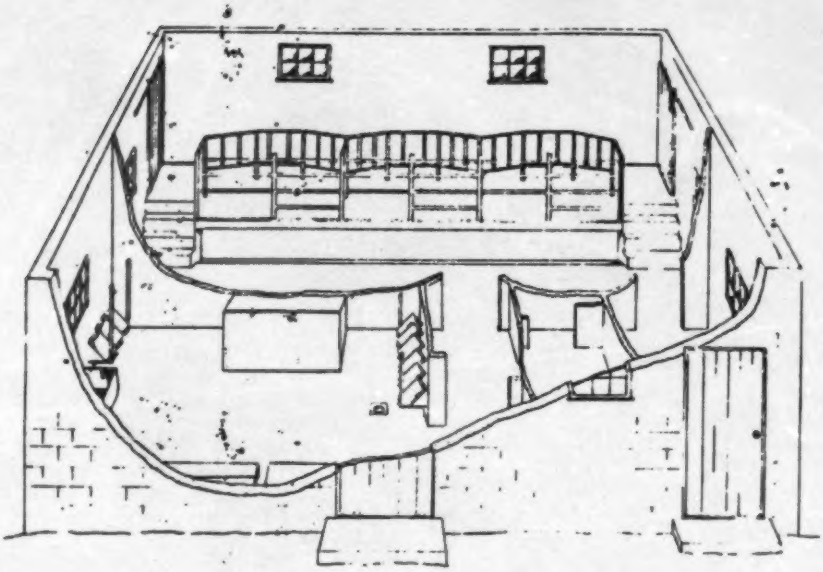
SWINE FINISHING LAYOUTS

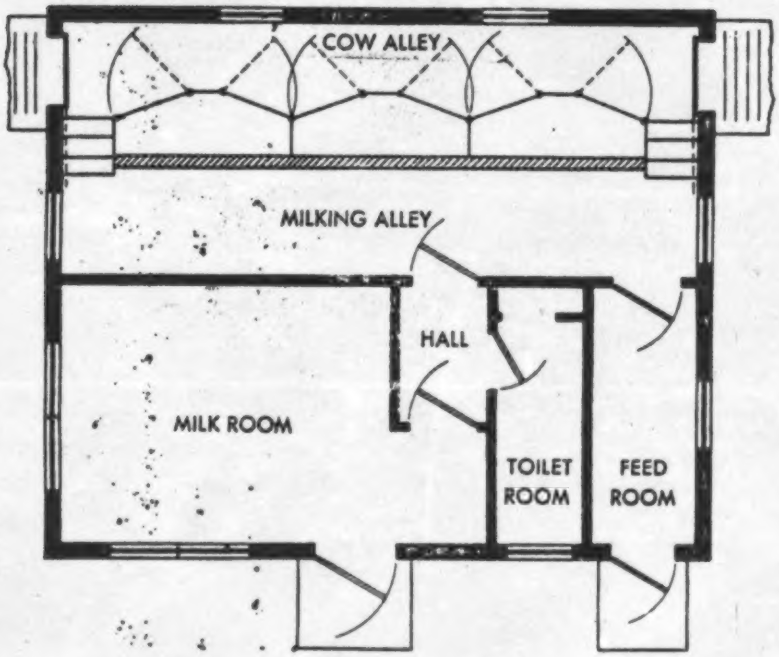




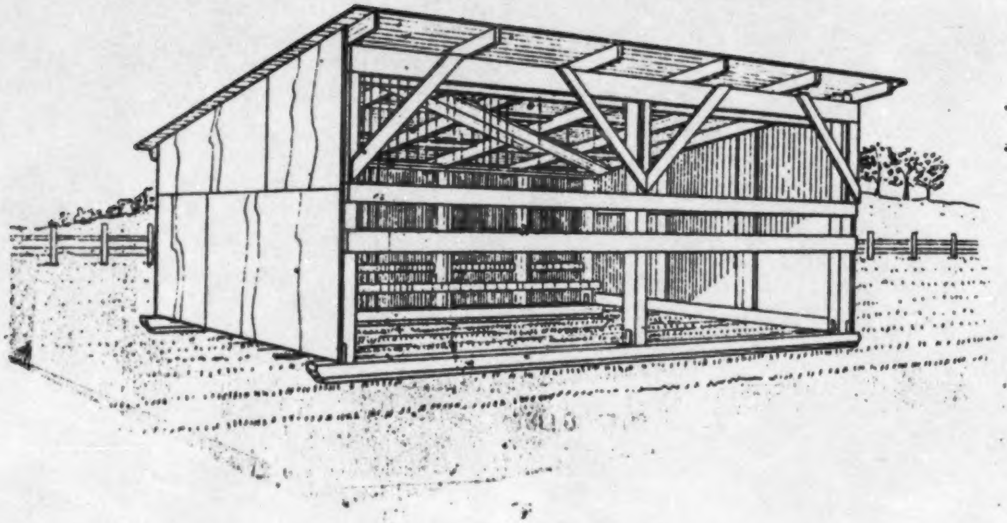


MILKING CENTER LAYOUT

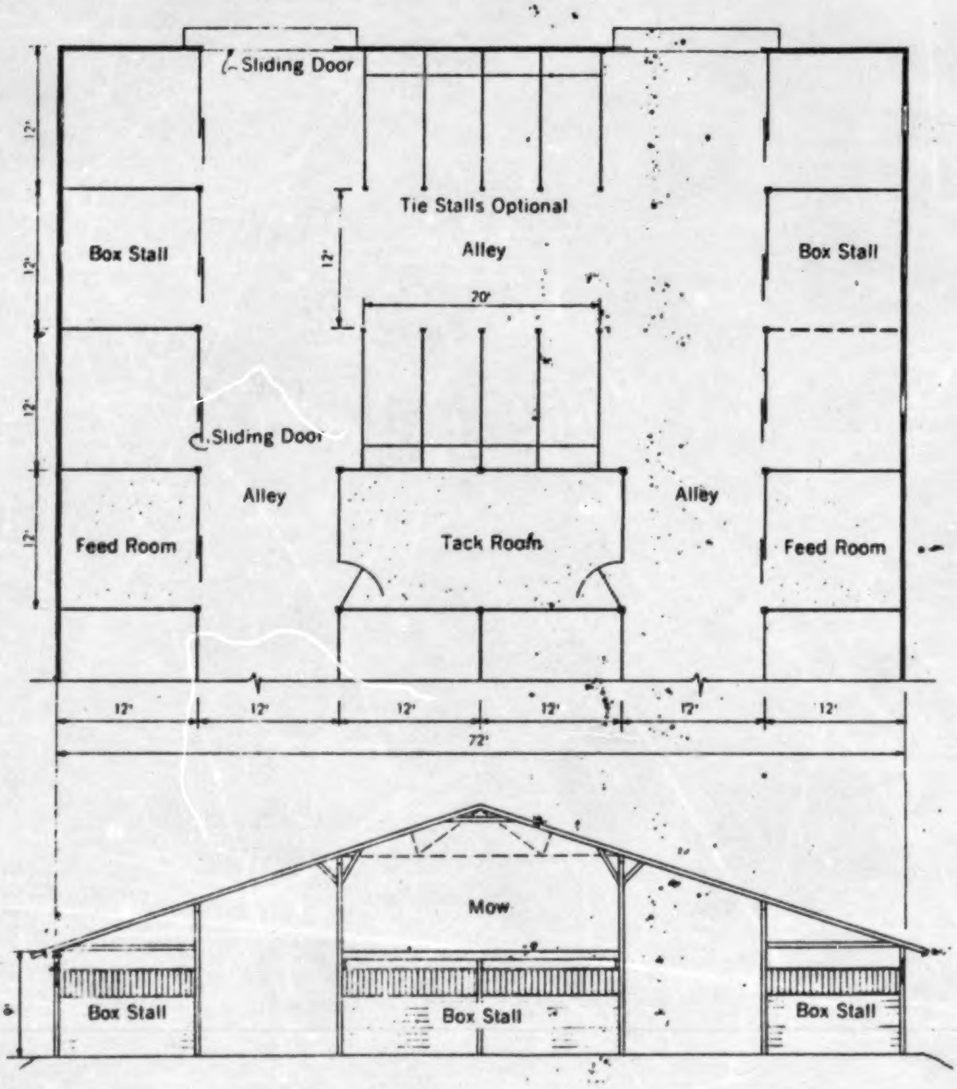




DAIRY CALF SHELTER



HORSE BARN LAYOUT



LIVESTOCK FACILITIES

UNIT IV

ASSIGNMENT SHEET #1: Designing Cattle Handling Facilities

Assume you are planning to construct new handling facilities for a 5,000 head feedlot. Determine the number of holding pens needed and draw a possible layout of the facilities needed. Be sure to include holding pens, crowding area, gates for cutting and sorting, working chute, loading chute, conditioning pens, and scales.

LIVESTOCK FACILITIES

UNIT IV

ASSIGNMENT SHEET #2: Designing Swine Systems

You are hired to design and build facilities for a 60 head farrow to finish swine confinement operation. The farmer wants to farrow three groups of 20 sows twice a year on his Kansas farm. Capital is available and he desires to minimize labor. Recommend to him a one-stage, two-stage, or three-stage system and then outline what each building should contain as far as facilities to meet his needs.

LIVESTOCK FACILITIES

UNIT IV

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #1:

a. Ten holding pens are needed

b. Layout should be similar to those shown on TM 1

Assignment Sheet #2:

a. A 3-stage production system is needed

b. Minimize labor through the use of slats, stalls or crates used in farrowing, etc.

LIVESTOCK FACILITIES

UNIT IV

TEST

1. Match the terms on the right to the correct definitions.

_____a. Farrowing pens modified so the sow can leave and enter at will.

_____b. Upright support that restricts dairy cows while milking.

_____c. Restricting animal living area to an enclosed, controlled environment.

_____d. Structures used in farrowing pigs that help separate the sow from her litter.

_____e. Small, portable structure used in pasture swine production.

1. Stalls
2. A-Frame
3. Stanchion
4. Free Stalls
5. Confinement

2. List the five common beef facility systems

a.

b.

c.

d.

e.

3. Calculate minimum sq.ft. of lot area needed for two pens of cattle, each with 120 head.

120 head x ___________sq.ft./head minimum x 2 pens = ______sq.ft.

4. List four benefits of night lighting in feedlots.

a.

b.

c.

d.

TEST

5. Explain what type of facilities are needed for cow-calf operations.

6. List four cattle handling facilities needed in all beef operations.

   a.

   b.

   c.

   d.

7. Match the swine system on the right that best fits each of the given situations on the left.

_____a. Capital available		1. Pasture
_____b. Farrow once a year		2. Confinement
_____c. Low value land available		
_____d. Labor limited		
_____e. Top level management available		
_____f. Land is rented		

8. Give an example of one-stage, two-stage, and three-stage production systems in swine building systems.

   a. One-stage:

   b. Two-stage:

   c. Three-stage:

TEST

9. Identify as true or false the following statements concerning components of confinement farrowing.

T F a. Farrowing in crates cause more death loss of baby pigs than farrowing in pens

T F b. Pens require more cleaning than stalls do

T F c. Slats help minimize labor

T F d. Free stalls are best for large producers

T F e. Slats should be used if sows are not turned out daily.

10. List four factors to consider when selecting a farrowing house layout.

a.

b.

c.

d.

11. Identify as true or false statements about confinement growing houses.

T F a. They reduce labor and feed efficiency

T F b. Partial or total slats recommended

T F c. Don't put over 25 pigs per pen

12. Identify space requirements in confinement hog finishing systems.

a. _________sq. ft. per pig needed

b. _________pigs per pen maximum

13. List the three gestating sow facility options

a.

b.

c.

TEST

14. Describe what building type is best suited for pasture production of swine.

15. List two advantages and one disadvantage of tethering sows.

Advantages

a.

b.

Disadvantage

a.

16. List three dairy milking herd housing factors.

a.

b.

c.

17. Identify as true or false the following statements concerning dairy stall barns.

T F a. Provides for greater individual attention of cows.

T F b. Best for herds over 60 in number.

T F c. Tie stalls are preferred over stanchion stalls.

T F d. Few problems with dirty platforms.

18. Free stall barns are practical for what size dairy herd?

TEST

19. Explain what must be done with building or remodeling plans for a milking center before construction begins.

20. Name the two types of dairy calf housing.

    a.

    b.

21. Describe adequate heifer and dry cow housing.

22. Name the two basic types of sheep housing.

    a.

    b.

23. Name the best sheep barn and lot layout for Kansas.

24. Describe the building need for horses kept outside.

25. List three functions of horse barns.

    a.

    b.

    c.

26. Name the two types of horse stalls and their sizes.

    a.

    b.

TEST

27. List two other facilities in a horse barn besides stalls.

    a.

    b.

28. Draw a handling facility for a 1,000 head feedlot, including chutes, holding pens, cutting gates, etc.

29. List the basic components of the buildings in a two-stage swine operation from farrow to finish.

LIVESTOCK FACILITIES

UNIT IV

ANSWERS TO TEST

1. a. 4
   b. 3
   c. 5
   d. 1
   e. 2

2. a. Barn and feedlot
   b. Feeding barn and lot
   c. Open feedlot
   d. Cold confinement barn
   e. Warm confinement barn

3. 120 head x 20 sq.ft./head x 2 pens = 4800 sq.ft.

4. Any four of the following:

   a. Cattle eat less with no reduction of daily gain.
   b. Less trouble with predators and theft.
   c. Greater animal safety with quieting effect.
   d. Less feed spoilage from roosting birds
   e. Reduces stress on new cattle
   f. Cattle eat during cool summer nights
   g. Better feed availability for timid cattle
   h. 24-hr. feeding reduces feedbunk space per head needed

5. Minimum facilities are needed. Portable calf shelters for calves on pasture and basic holding and sorting pens and working and loading chutes.

6. Any four of the following:
   a. Holding pens
   b. Sorting and cutting gates
   c. Headgate and working chute

ANSWERS TO TEST

d. Loading chute.
e. Conditioning lots.

7. a. 2
b. 1
c. 1
d. 2
e. 2
f. 1

8. a. Farrow to finish in one building
b. Farrow to grower → grower to market (2 buildings)
c. Farrow → grower → finish (3 buildings)

9. a. F
b. T
c. T
d. F
e. T

10. a. Manure handled as solid or liquid.
b. Sows fed in or aways stalls or pens.
c. Sows face each other or the outer walls.
d. Stalls or pens used.

11. a. F
b. T
c. T

12. a. 6
b. 25

13. a. Confinement
b. Open Shelter
c. Pasture

14. Portable facilities such as A-frame houses

15. Advantages: Any two of the following:
a. Little investment.

ANSWERS TO TEST

b. Easier to care for with no stall.

c. Sows appear more at ease.

Disadvantage:

a. 10% of first group of sows do not adapt and must be culled.

16. Any three of the following:

    a. Number of cows
    b. Stall arrangement, size, and type
    c. Stall platform covering
    d. Pens needed
    e. Insulation and ventilation type
    f. Kind of milking system

17. a. T c. T
    b. F d. F

18. Herds of 100 cows or more

19. Must obtain approval from U.S. Public Health department.

20. a. Cold
    b. Warm

21. Loose housing resting area with a manure pack

22. a. Open-front building
    b. Completely enclosed building

23. Open-front barn with lot

24. Open-front barn

25. Any three of the following:

    a. Breeding
    b. Riding
    c. Loose housing

ANSWERS TO TEST

d. Hay

e. Utility

26. a. Box stalls: 12' x 12'

b. Tie stalls: 5' x 9'

27. a. Tack Room

b. Feed Room

28. Refer to TM 1

29. Building 1: Farrow and growing facilities, farrow in pens and remove guard rails for growing.

Building 2: Grow and finish on at least partial slats in pens of 25 head or less.